



BARBADOS

ANNUAL REPORT

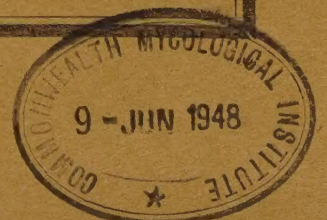
OF THE

Department of Science
and Agriculture

FOR THE YEAR

1946—47

Advocate Co., Ltd.—Barbados.





BARBADOS

ANNUAL REPORT

OF THE

Department of Science
and Agriculture

FOR THE YEAR

1946—47

DEPARTMENT OF SCIENCE AND AGRICULTURE

STAFF :

Director of Agriculture	S. J. SAINT, C.M.G., O.B.E., M.Sc., Ph.D., F.R.I.C. (London).
Deputy Director of Agriculture	M. HALCROW, O.B.E., B.Sc., Dip. Agric. (Cantab), A.I.C.T.A.
Entomologist	R. W. E. TUCKER, M.A., (Cantab) B.Ed., (Capetown).
Botanist	D. M. HANSCHHELL, B.Sc., A.I.C.T.A.
Chemist	F. H. B. BLACKBURN, B.Sc., A.R.I.C.
Government Analyst	C. A. COPPIN, B.A.Sc. (Toronto), A.R.I.C.
Lecturer in Natural and Agricultural Sciences	F. A. SWEET, B.Sc., A.R.I.C.
Lecturer in Natural Sciences	F. N. A. FIELDS, B.Sc.
Lecturer in Botany, Chemistry and Physics	V. A. A. ARCHER, B.S.A. (McGill) M.S.A. (Toronto) F.C.I.C.
Extra Science Teacher	M. A. MAXWELL
Plant Diseases Inspector	D. R. D. WILES, D.I.C.T.A.
Principal Clerk	H. O. RAMSEY
Senior Clerk	G. D. RAMSEY
Clerk	A. S. INNISS
Clerk	C. B. LONG
First Agricultural Assistant	C. B. FOSTER
Agricultural Assistant	H. E. WARD
" "	L. H. ATKINSON
" "	W. M. FOSTER
" "	J. E. CLARKE
Senior Peasant Agricultural Instructor	*A. D. HERBERT, D.I.C.T.A.
Peasant Agricultural Instructor	G. B. PILGRIM

* Seconded as Assistant Livestock Officer.

Peasant Agricultural Instructor	..	..	..	F. E. BYNOE
"	"	"	..	L. T. TALMA
"	"	"	..	C. B. CUMMINS
"	"	"	..	G. A. RAMSEY
"	"	"	..	C. D. SPOONER
"	"	"	..	E. S. BRATHWAITE
"	"	"	..	F. M. CUMMINS
"	"	"	..	V. F. GAY
"	"	"	..	A. YARD
"	"	"	..	E. G. ST. JOHN
Field Assistant	..	..	..	V. E. JAMES
Analytical Assistant	..	..	..	H. A. JONES
"	"	..	..	L. A. HALL
"	"	..	..	K. H. C. THORNE
Sugar Analyst	..	..	..	C. ST. A. ALLEYNE
"	"	..	..	R. E. BARROW
"	"	..	..	E. W. MAXWELL
Entomological Assistant	..	..	..	W. HEADLEY
Government Laboratory Messenger	..	..	..	L. H. MOORE
Agriculture Department Messenger	..	..	..	G. BARKER
Government Laboratory Attendant	..	..	..	H. A. WHARTON
Entomological Laboratory Attendant	..	..	..	A. GITTENS
Foreman in Charge of Nurseries	..	..	..	T. O. HOYTE
Assistant Gardener	..	..	..	F. A. JORDAN

COLONIAL DEVELOPMENT & WELFARE SCHEMES

Scheme D.217—Agricultural Development.

Senior Livestock Officer	..	..	..	A. G. MILL
Asst.	"	"	..	A. D. HERBERT
Co-operative Officer	..	..	..	J. M. CAVE, D.I.C.T.A.
Manager—Central Livestock Station	..	..	..	H. E. KIRTON
Overseer	"	"	..	J. K. DRAYTON
Secretary — Barbados Dairy and Stock Breeder's Association	..	..	..	A. G. F. SEALE
Clerk—C. D. & W. Schemes	..	..	..	E. A. B. DEANE
Clerical Assistant	..	..	..	T. A. CRAWFORD
Clerical	"	..	..	F. B. TAYLOR

Scheme D.235—Experimental Cotton Spinning Plant.

Cotton Operator	..	..	..	N. H. POMFRET
Manager	..	..	..	N. A. PHILLIPS

Scheme D.254—Fishery Officer and Staff.

Fishery Officer	..	..	..	D. W. WILES
Clerical and Travelling Asst. to Fishery Officer	..	..	..	O. E. MOSELEY

Dr. Saint was absent from the colony on six months vacation leave from May 20th, 1946 and Mr. R. W. E. Tucker, Entomologist was appointed to act during his absence.

Mr. M. Halcrow, Agricultural Officer, Kenya, was appointed Deputy Director of Agriculture in succession to Dr. A. E. S. McIntosh. Mr. Halcrow arrived in the colony on June 10th and assumed duty on the following day.

Mr. W. A. Paterson, B.Sc., Lecturer in Natural and Agricultural Sciences, was transferred to the post of Science Master at Queen's Royal College, Trinidad with effect from May 31st, 1946. Prior to taking up his duties in Trinidad, he was granted three months vacation leave as from March 1st.

Mr. F. A. Sweet, Lecturer in Natural Sciences, was appointed to succeed Mr. Paterson with effect from the 1st June.

Mr. F. N. A. Fields, B.Sc., was appointed to succeed Mr. Sweet as Lecturer in Natural Sciences with effect from the 13th September, 1946.

Mr. F. H. B. Blackburn was granted four and one-half months vacation leave from September 10th, 1946.

Mr. D. W. Wiles, Fishery Officer, was granted six months study leave in the United Kingdom during the first six months of the year. During the absence of Mr. Wiles, Mr. O. E. Moseley, Travelling and Clerical Assistant, acted as Fishery Officer.

BRITISH WEST INDIES SUGAR CANE BREEDING STATION

ADVISORY COMMITTEE

Chairman — S. J. Saint, C.M.G., O.B.E., M.Sc., Ph.D., F.R.I.C. (London)
Director of Agriculture, Barbados.

Members — H. J. Page, M.B.E., B.Sc., F.R.I.C., F.I.R.I., Principal of the
Imperial College of Tropical Agriculture.

J. C. Muir, O.B.E., B.Sc., Agri. (Glasgow) N.D.A., N.D.D.
Director of Agriculture, Trinidad.

D. Sturdy, O.B.E., M.A., Director of Agriculture, Jamaica.

H. H. Croucher, B.Sc. A.I.C.T.A., Director of Agriculture,
British Guiana.

(Vacant) Director of Agriculture, Leeward Islands.

C. C. Skeete, B.A., Director of Agriculture Windward Islands.

H. E. Robinson, Representing the B.W.I. Sugar Association.

Botanist — B. deL. Inniss, B.Sc., A.I.C.T.A.

Agricultural Assistant N. L. Foster

„ „ C. D. Gilkes

Statistical Clerk E. L. Jones

BOARD OF AGRICULTURE

The members of the Board of Agriculture appointed for the Legislative Session, 1946-1948 were as follows :—

The Hon. S. C. Thorne, M.L.C., Chairman

„ „ G. D. L. Pile, O.B.E., M.L.C.

„ „ J. D. Chandler, M.L.C.

J. A. Haynes, B.A., M.C.P.

H. W. Springer, M.A., M.C.P.

H. A. Dowding, M.C.P.

E. L. Ward, M.C.P.

F. E. C. Bethell.

The Director of Agriculture is an *ex-officio* member of the Board.

REPORT ON THE WORK OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE FOR THE YEAR ENDING 31ST MARCH, 1947.

TABLE OF CONTENTS

Page

PART I.

SUMMARY OF AGRICULTURAL POLICY

PART II.

GENERAL

I. INTRODUCTION	7
II. WEATHER CONDITIONS DURING THE YEAR	7
III. RECENT DEVELOPMENTS IN THE ACTIVITIES OF THE DEPARTMENT	8
(a) Peasant Agriculture	8
(b) Animal Husbandry	8
(c) Pine Plantation	9
(d) Co-operation	9
(e) Mechanisation	9
(f) Irrigation	10
(g) Fisheries	10
(h) Rehabilitation of Ruinate Areas	10
(i) Cotton Spinning.	11
IV. AGRICULTURAL CROPS	11
A. SUGAR CANE	
(a) Production	11
(b) Export of Sugar and Local Consumption	12
(c) Fancy Molasses	12
(d) Acreage under Cane	12
(e) Variety Acreages	13
B. COTTON	14
C. MINOR CROPS, SEED AND PLANT DISTRIBUTION	15
D. LOCAL FOOD PRODUCTION	15
(a) Ground Provisions	15
(b) Meat Production	15
(c) Government Processing Factory	16
V. PESTS AND DISEASES	16
(a) Pests	16
(b) Diseases	16

TABLE OF CONTENTS

Page

PART III.

SECTIONAL REPORTS

Section 1	Peasant Agriculture by M. Halcrow	17—21
" 2	Sugar Cane Breeding and Seedling Testing by B. deL. Inniss	22—33
" 3	Botany by D. M. Hanschell	34—42
" 4	Chemistry by F. H. B. Blackburn	43—48
" 5	Government Laboratory by C. A. Coppin	49—52
" 6	Entomology by R. W. E. Tucker	53—59
" 7	Plant Diseases and Cotton by D. R. D. Wiles	60—61
" 8	Animal Husbandry by A. G. Mill	62—64
" 9	Fisheries by D. W. Wiles	65—68
" 10	Co-operation by J. M. Cave	69—70
" 11	Experimental Cotton Spinning Plant by H. W. Pomfret.	71—73

PART IV

FINANCIAL STATEMENT

74

PART V

AGRICULTURAL LEGISLATION

75

PART VI

LIST OF PUBLICATIONS ISSUED BY THE DEPARTMENT OF SCIENCE AND AGRICULTURE FROM 1925 TO DATE

76—89

APPENDIX I

METEOROLOGICAL OBSERVATIONS RECORDED AT THE METEOROLOGICAL STATION CODRINGTON FOR 1946

81

APPENDIX II

BARBADOS RAINFALL FROM JANUARY TO DECEMBER, 1946

PART I

SUMMARY OF AGRICULTURAL POLICY

1. The conservation of soil and the maintenance and improvement of soil fertility.
2. The control of pests and diseases of crops.
3. The improvement of crop yields by selection and breeding.
4. The maintenance of a sound animal husbandry industry as an integral part of the farming system.
5. The development and improvement of the fishing industry.
6. The encouragement of the production of local food crops; especially green vegetables.
7. The stimulation of co-operative ventures; particularly amongst small holders.
8. The development of irrigation in suitable areas.

PART II

GENERAL

1. INTRODUCTION

The last comprehensive Annual Report on the work of the Department of Science and Agriculture was that for the year ending 31st March, 1939. Subsequent to that date, the Annual Report was drastically reduced in size owing to conditions brought about by the war and gave only a general survey of the activities of the Department. This issue marks the restoration to pre-war size, and enables a full report to be given of the work carried out in each section of the Department during the year ending 31st March, 1947.

Since the last full-sized report was issued in 1939, the activities of the Department have widened very considerably; many of these developments have been financed under the Colonial Development and Welfare Act. New sections of the Department which have been created deal with Animal Husbandry, Fisheries, Co-operation and Cotton Spinning. During the war period when these developments were evolved, the Director of Agriculture also undertook the duties of Controller of Supplies.

Barbados is a densely populated Colony and has always been largely dependent for its food supplies on imports which necessitate sea transport. At the outbreak of war, it was essential that the Colony should be made more self-sufficient and an Order was made under the Defence Regulations compelling the planting of food crops. Growers were required to plant a certain percentage of their arable land in certain specified food crops and this percentage was stepped up during the war period from five to thirty-five percent. An Advisory Committee representative of planters and peasants was appointed to assist the Director of Agriculture and with the co-operation of growers the Colony was able to maintain an adequate supply of bulk foodstuffs during these anxious times. The Defence Order is still in operation although the area of arable land which must be compulsorily planted in food crops for the 1947 crop year has been reduced to twenty-six percent.

II. WEATHER CONDITIONS DURING THE YEAR

Detailed climatic conditions as recorded at the Meteorological Station at Codrington, St. Michael are given in Appendix I to this report. Water is the principal factor limiting crop growth in Barbados and as the water supply is almost entirely dependent on rainfall, the average monthly rainfall for the Colony is an important factor to record. The average rainfall for the period November 1945 — January 1947 which is the period affecting the sugar cane crop compared with the average rainfall for the past 100 years is set out in Table I.

TABLE I

Month	Rainfall in Inches	
	Average 1847—1946	Average 1945—1947
November ..	7.78	6.89
December ..	4.80	2.55
January ..	3.37	4.03
February ..	2.11	2.12
March ..	1.94	0.78
April ..	2.33	3.60
May ..	3.19	3.42
June ..	5.31	3.41
July ..	6.21	5.30
August ..	7.26	5.65
September ..	7.66	5.91
October ..	7.77	2.77
November ..	7.78	3.89
December ..	4.80	5.77
January ..	3.37	3.37
Total ..	75.68	59.46

The average monthly rainfall figures for the Island for the fifteen months' period November 1945 to January 1946 when compared with the one hundred year average shows that there was a general shortage of rain during the normal rainy season—July to December. The months of October and November are almost invariably wet but during the period under review, these months were exceptionally dry; in fact drier than at any time during the past one hundred years.

III. RECENT DEVELOPMENTS IN THE ACTIVITIES OF THE DEPARTMENT

(a) Peasant Agriculture

The policy of raising the standard of peasant agriculture which was adopted before the war has been continued with good effect. The number of Peasant Agricultural Instructors was increased from three to twelve by an Act passed in 1940. Six District Agricultural Stations have been established with funds provided under the Colonial Development and Welfare Act, and a Peasant Agricultural Instructor has been placed in charge of each. These stations are being used as stud centres and to develop systems of agriculture based on mixed farming, so that visual as well as verbal instruction can be given. Market gardens have also been established on the stations and the small holder is being encouraged to grow, with the aid of irrigation, green vegetable crops which are profitable and in short supply.

(b) Animal Husbandry

In 1945, the Government acquired the Pine Plantation for use partly as a Live Stock Station and partly for housing. The Central Live Stock Station which will occupy about 100 acres of this Plantation is being established with funds provided under the Colonial Development and Welfare Act, and the erection of buildings was nearly completed during the year under review. It is proposed to carry out investigations at the Live Stock Station to develop a

system of dairying as an ancillary to sugar cane agriculture; stud animals will be maintained for the improvement of all classes of stock. A detailed system of costings has been instituted so that the economics of growing crops and producing animal products can be accurately determined.

(c) Pine Plantation

Until the Housing Scheme is commenced, the Director of Agriculture has been required to continue to farm that part of the Pine Plantation not required for the use of the Central Livestock Station. The Pine Plantation consists of approximately 324 acres of which 194 acres are arable. Funds had been provided under the Colonial Development and Welfare Act to meet the running expenses of the Central Livestock Station and the Government provided further funds to purchase the necessary live and dead stock and to meet the additional recurrent expenses incurred.

In Table II the acreages of cane and food crops planted and reaped on all lands of the Pine Plantation since the Government accepted ownership are set out :—

TABLE II.

	Reaped in 1946	Planted and reaped in 1947	Planted for reaping in 1948
<i>Sugar Cane</i>	acres	acres	acres
Plant canes ..	38	72	56½
First Ratoons ..	54½	33½	63
Second Ratoons ..	39¾	16½	—
Total ..	112¼	122	119½
<i>Food Crops</i>			
Yams ..	19	17½	
Sweet Potatoes ..	24½	24½	
Other ..	11¾	7½	
Total ..	55¼	49½	
<i>Fodder Crops</i>			
Guatemala Grass ..	—	5¾	
Maize ..	6	9¾	
Guinea Corn ..	3¾	12	
Other ..	—	—	
Total ..	9¾	27½	

(d) Co-operation

A Co-operative Officer has been appointed to the staff of the Department with the assistance of a grant made from Development and Welfare Funds. There is wide scope in Barbados for the development of co-operation, especially amongst the small holder, and, although it is realised that progress will be slow, it is evident from the work already carried out by this officer that positive results can be attained. The Co-operative Officer has visited Jamaica to learn as much as possible from the experience gained in that Colony of co-operatives. He will shortly proceed to the United Kingdom to attend a course of instruction which has been organised by the Secretary of State.

(e) Mechanisation

On the plantations, there has been a trend in recent years towards the mechanisation of agricultural operations and, with the increase in agricultural

wages and the easing of the supply position, this trend is becoming more and more general. Most of the local soils are shallow and, in the undulating areas, some sheet erosion occurs during heavy rains in spite of the cane hole system of cultivation. In the days of low labour costs, it was possible to rectify this by "moulding the brows" which meant carrying the soil back up the slopes. With mechanisation, sheet erosion is likely to create big problems on these shallow soils unless adequate steps are taken by contour cultivations to arrest erosion; with the prevailing high labour costs it will not be possible to carry back the soil by hand. Practical demonstrations and lectures to illustrate the methods which must be adopted have been given both on the plantations and at the District Agricultural Stations. Many advisory visits have also been made on request by officers of the Department, who have assisted in laying out contours in individual fields. It is gratifying to note that the importance of this work has been appreciated and, with further assistance and encouragement from the Department, there is little doubt that adoption of anti-soil erosion methods of cultivation will be general.

(f) Irrigation

With a grant made under the Development and Welfare Act, Dr. Alfred Senn, Geologist of the British Union Oil Company Limited, carried out a detailed investigation of the ground water resources of Barbados and published a comprehensive report during 1946. This report shows that considerable reserves of water are available under the coral limestone area, which can be used for irrigation. Agricultural production in Barbados is largely limited by the supply of water so that this finding is of vital importance to the Colony, provided that subsequent work shows that the water can be economically used for irrigation purposes. Experimental work on various methods which have been used elsewhere for overhead irrigation is now being undertaken by the Department so that experience and results gained under local conditions will be available when large scale irrigation schemes come under consideration.

(g) Fisheries

In 1944, the Director of Agriculture was placed in control of Fisheries and in the same year a Fishery Officer was appointed under a Development and Welfare Scheme. An Advisory Committee, with the Director of Agriculture as Chairman has been formed to advise the Government on all matters connected with Fisheries. The principal activities of this section have been to make loans out of funds advanced by the Government for the rehabilitation of the fishing industry; to draw up a Scheme for the erection of a new Bridgetown Fish Market which is already in operation; the widening of channels between the coral reefs to facilitate navigation for fishing boats and to draw up a comprehensive scheme for fishery development. This scheme has been included in the Ten Year Development Plan for Barbados and envisages, amongst other things, the setting up of a Fishery Experimental Station.

(h) Rehabilitation of Ruinate Areas

Much of the steep hillsides in the Scotland area are very badly eroded. In 1942, a typical hillside at Haggatts, St. Andrew was planted with trees and a natural cover was allowed to grow. On a second hillside which was acquired in 1945, no trees were planted but natural regeneration is being encouraged by preventing damage to vegetation by man and beast. These experiments have been financed under the Development and Welfare Act and, on the basis of the experience gained, a comprehensive scheme for the rehabilitation of this area has been drawn up.

(i) Cotton Spinning

In order to determine whether cotton spinning could be established in the West Indies as a secondary industry, the Comptroller for Development and Welfare undertook to test its possibilities on a semi-commercial experimental basis. Funds for the experiment were provided under the Colonial Development and Welfare Act. A small second-hand plant was purchased and shipped to Barbados; an area of land was leased at a pepper corn rental and a building was erected to house the Plant. In June 1945, the control of the scheme was transferred to the Government of Barbados and the Director of Agriculture undertook the responsibility for its supervision. Machinery for the plant was found when unpacked to be in a very rusty condition and, as no drawings or detailed instructions were sent out with the Plant, the local engineers who had no practical knowledge of this type of machinery, had much difficulty in its erection. Mr. H. B. Warrington, Cotton Operator, arrived in Barbados in 1945 to operate the plant and to train local personnel but, unfortunately, he had to leave for health reasons before the plant commenced operations. He was succeeded in July 1946 by Mr. H. N. Pomfret but the plant could not be got into working order until the end of the year owing to the lack of some essential portions of equipment and the time taken to obtain spares and replacements from the manufacturers. Towards the end of the year under review, the plant was operating on a part time basis and five girls were being trained as operatives. It is gratifying to note that Mr. Pomfret was very pleased at the apt manner with which these trainees learnt the necessary operations.

IV. AGRICULTURAL CROPS

A. SUGAR CANE

(a) Production

During the 1946 crop season there were manufactured 111,933 tons of vacuum pan sugars, 1,377 tons of muscovado sugar and 6,735,319 wine gallons of fancy molasses which, at the rate of 330 wine gallons to the ton of sugar, is the equivalent of 20,410 tons of sugar. The total production of sugar, therefore, amounted to 133,720 tons which is the second largest crop recorded in the production of this colony.

In the 1946 calendar year, there was a low rainfall from January to November and this will undoubtedly result in a lower cane crop to be reaped during the 1947 crop season. Heavy showers which fell during December, 1946 and January, 1947 gave some renewed growth to the cane and the crop is estimated to reach the equivalent of between 110,000 and 112,000 tons of sugar.

The sugar production in Barbados for the past six years is set out in Table III.

TABLE III
Sugar production for the period 1940—46

	1940	1941	1942	1943	1944	1945	1946
Vacuum Pan Sugar	67,136	71,226	86,700	132,031	82,819	98,120	111,933
Muscovado	3,068	3,367	2,895	1,242	1,508	1,113	1,377
Fancy Molasses	27,020	25,780	19,438	—	20,175	20,215	20,410
Total	97,224	100,373	109,033	133,273	104,502	119,448	133,720

(b) Export of Sugar and Local Consumption

During the year there continued to be a general world shortage of sugar and the Ministry of Food again purchased all of the colony's exportable surplus of sugar.

The position with regard to local consumption and exports during the 1945/46 year may be summarised as follows :—

Estimated Stocks in hand for Export at 1st September, 1945.

Fancy Molasses	5,574 tons	tons
Sugar	8,908 tons	14,482
Production Crop 1946 .. .. .	.. .. .	133,720
		148,202

Estimated Stocks in hand for Export at 1st September, 1946

Fancy Molasses	4,584 tons	
Sugar	39,745 tons	44,329
		103,873

Total Exports for quota year 1945/46 as per Customs Returns

Fancy Molasses	20,740 tons	
Sugar	69,313 tons	90,053

Difference representing sugar left in the Island for Local Consumption and export to neighbouring B.W.I. Colonies 13,820

By the end of December, 1946 most of the 44,329 tons of exportable sugar in hand at 1st September had been exported.

(c) Fancy Molasses

The Barbados Fancy Molasses Industry has continued to be under the Control of the Fancy Molasses Control and Marketing Board of which the Director of Agriculture is Chairman.

At the end of December, 1945, little fancy molasses remained in stock. The Fancy Molasses Control and Marketing Board allocated some 60,000 puncheons for production during 1946 for export. Of this quantity some 42,000 puncheons were manufactured by the small fancy molasses producers, and the remainder by vacuum pan factories.

For the year 1947, the Fancy Molasses Control and Marketing Board has allocated some 67,400 puncheons of fancy molasses for production for export. This is an increase of 7,400 puncheons over the quantity allocated in respect of the 1947 crop year and was authorised by the Ministry of Food. Of the quantity allocated for production for export it is expected that the small fancy molasses manufacturers, producing to capacity, will manufacture about 52 percent while the remainder will be produced by vacuum pan factories with the necessary facilities.

(d) Acreage under Cane

Under the Sugar Cane Census Act, 1937-31, it is compulsory for all landholders with more than ten acres of land to make a return to the Department of Agriculture, showing the acres of cane, and the various varieties to be reaped during the ensuing crop season.

The result of the census for the 1947 crop is presented in Table IV, together with the corresponding figures for the years 1940 to 1946 inclusive.

As a result of the recent surveys the estimated small-holders' acreage under cane has been increased from 7,000 to 8,000 acres.

TABLE IV

Acreage of sugar cane reaped in the years 1940—1946 and the acreage to be reaped in 1947.

Year	ACREAGES							
	Plantations						Small Holders Estimat'd	Total
	Plant Canes	First Ratoons	Second Ratoons	Third Ratoons	Fourth Ratoons	Fifth Ratoons		
1940	15,618.12	11,810.83	5,598.74	1,518.73	173.65	5.00	7,000	41,725.07
1941	14,059.36	11,846.46	6,580.47	1,942.74	237.05	5.00	7,000	41,671.08
1942	15,023.77	9,928.64	5,651.64	2,278.44	348.13	11.75	7,000	40,242.37
1943	15,374.95	10,004.44	3,629.84	1,235.49	293.74	6.86	7,000	37,545.32
1944	14,144.22	10,557.28	4,203.08	814.51	72.82	4.50	7,000	36,796.41
1945	14,551.53	9,744.58	4,756.20	865.70	52.02	1.34	7,000	36,971.37
1946	14,056.25	11,614.50	5,578.25	1,817.50	51.25	6.00	7,000	40,123.75
1947	13,365.25	11,569.00	6,501.00	1,771.50	257.25	2.25	8,000	41,466.25

The reduction of the acreage under sugar cane from the year 1942 onwards was due to the compulsory increased planting of provision crops under the Local Food Production (Defence) Control Order 1942, No. 2.

(e) Variety Acreages

These were obtained from plantation returns of the variety acreages to be reaped each year. The variety percentages for all crops for the years 1940 to 1947 are presented in Table V.

TABLE V.

Percentages of acreages of Sugar Cane Varieties recommended by the Department and other varieties reaped during the period 1940 — 1947.

PERCENTAGES OF TOTALS

Varieties	1940	1941	1942	1943	1944	1945	1946	1947
B.2935	43.01	45.66	42.45	20.95	4.73	1.94	0.68	0.26
B.H.10(12)	23.15	22.16	19.81	12.69	8.00	4.76	3.19	2.49
B.726	19.48	17.33	15.64	9.58	4.79	2.95	2.02	1.26
B.3013	8.26	8.58	8.42	5.84	2.98	1.38	0.52	0.17
B.3127	2.20	3.30	3.33					
Mixed and other Vars.	3.90	2.97	2.90	3.45	3.79	1.58	1.08	0.63
B.3439			3.60	8.35	9.49	4.89	2.40	0.54
B.37161			1.48	26.77	48.69	62.65	74.52	83.83
B.35187			2.37	10.19	11.28	10.19	6.09	3.25
B.35245				1.85	2.06	1.60	0.67	0.13
B.34104					4.19	7.46	6.89	3.83
B.4098				0.33		0.33	1.56	3.00
B.38155						0.27	0.28	0.28
B.41227							0.06	0.08
B.41211							0.04	0.21
B.40105								0.02
B.40102								0.01
B.37193								0.01

It will be seen from the above table that the nobilised seedling B.37161 has very rapidly replaced the standard noble canes B.2935, B.H.10(12) and B.726 during the five year period 1943 to 1947. The seedling B.37161 is a third nobilisation of *S. barberi*. It is vigorous in growth, fairly drought resistant, suitable to all ecological areas of the island and has a juice of a very high purity. Unfortunately, this seedling is a very bad "trashier" and is difficult to clean for milling.

B. COTTON

During the year under review, cotton planting took place in July instead of in September. This change, representing a shortening of the close season to three months, was made possible since no pink boll worm has been found in the island for seven years in succession.

In spite of the encouragement of a shorter close season and an earlier planting date, the request to the Department for seed for planting purposes was sufficient to plant 153 acres only, of which 125 acres were applications from peasants and 28 acres from planters. The actual area of cotton reaped amounted to 125 acres which produced 52,690 lb. seed cotton. There was little loss owing

to defoliation of cotton plants by caterpillar attack due to adequate use of lead arsenate sprays.

Progeny row selections were continued at Codrington Experiment Station. No selection was made during the 1945/46 period since it was found that crossing had taken place in the previous crop and the whole experiment had to be discarded.

C. MINOR CROPS, SEED AND PLANT DISTRIBUTION

Elsewhere in this Report it will be seen that much work has been carried out on the propagation of economic fruit trees and on trials with maize, fodder crops, grasses including lawn grasses and legumes. The distribution of casuarina trees has been continued with the object of creating fire wood reserves.

D. LOCAL FOOD PRODUCTION

(a) Ground Provisions

As in the war years, the acreage of food crops grown during the year under review was regulated by Notice served under the Local Food Production (Defence) Control Order. Owners of land were required to plant a minimum of 26 percent of their arable acreage in food crops of which at least 6 percent was required to be 'thrown-out' land. The areas of crops to be grown were as follows :—

Preparation land (20% of arable land)

Yams	46%
Sweet Potatoes	34%
Corn, eddoes, pulses etc.	20%

Thrown-out land (minimum of 6% of arable)

Sweet Potatoes	100%
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Weather conditions were not favourable for the early planting of food crops, but a survey which was completed in September indicated that approximately 80% of the required acreage had been planted. Unfortunately most of the crops suffered from the poor rainfall which was experienced in October and the greater part of November. On the whole fair crops of sweet potatoes and corn were harvested but the main crops of yams and eddoes did not give satisfactory yields.

(b) Meat Production

In 1941, owing to the cessation of imports of frozen fresh meat, there was a steady and dangerous increase in the slaughtering of all classes of livestock. Powers were therefore exercised under the Local Food Production (Defence) Control Order restricting the slaughter of breeding animals and underweight stock and a Notice was issued compelling all owners of plantations to keep a certain prescribed minimum number of livestock for each twenty acres of land. This action gradually resulted in an increase in the livestock population of the island. The regulations controlling the slaughter of cattle,

sheep and goats were removed in 1945, since it was considered that a sufficient number of young stock had been raised in the interim period and considerable difficulty was being experienced in feeding animals owing to the shortage of concentrated feeding stuffs. The regulations were maintained in the case of pigs since this animal reproduces and grows meat rapidly.

(c) The Government Processing Factory

This factory was erected mainly for the processing of cassava flour as a war-time measure to safeguard against the possibility of shortages of imported wheaten flour. After the war, this precaution was no longer necessary and it was decided to relax the regulations requiring the growing of cassava so that in view of the world sugar shortage more sugar cane could be planted. A relatively small area of cassava was planted in the year under review from which 1,503 bags of cassava meal were manufactured. During the years 1943/44; 1944/45 and 1945/46 the average annual production of cassava meal was over 21,000 bags of 100 lbs. each.

V. PESTS AND DISEASES

(a) Pests

No new pests were recorded during the period under review. The control of the main pest of sugar cane *Diatraea saccharalis* was maintained with timed liberations of the egg parasite *Trichogramma minutum*.

At one time it appeared that the stem weevil *Metamasius sericeus* which is normally a secondary pest was on the increase because it flourished in the variety B.35187. This variety is now being replaced by newer varieties and the incidence of this pest appears on the decrease.

The leaf hopper, *Empoasca fabalis*, which causes leaf curl and stunting and some loss in yield of sweet potato crops has increased in incidence in recent years with the increased areas planted to this crop. Experiments to control this pest are being carried out.

(b) Diseases

No new diseases of the main agricultural crops or of animals have been reported. Work designed to evolve a satisfactory technique for the testing of the resistance of new cane varieties to mosaic is continuing and field trials with new varieties of vegetables resistant to the commoner diseases such as mildew, mosaic, rust etc., are constantly being made.

PART III

SECTION I

PEASANT AGRICULTURE

By

M. HALCROW, O.B.E.

Deputy Director of Agriculture

Some idea of the magnitude of the task facing the Peasant Agricultural Services of the Department can be judged from some of the results of a comprehensive survey of peasants' holdings begun four years ago which was only finished early in 1946. All holdings from one-eighth to ten acres were visited and various data collected. The results of the survey will be published in due course together with relevant data from other sources in order to give an accurate picture of peasant agriculture in the colony. The survey showed that there were 27,620 peasant holdings between the limits stated, of which 4,126 were greater than one acre. The total area operated was 17,082 acres. It can be seen, therefore, that if the area of land held by peasants is relatively small, the number of families concerned is large.

Elsewhere in this Annual Report it is stated that the eleven Peasant Agricultural Instructors visited upwards of 8,000 holdings during 1946-47. It is obvious that the peasants will have to be organised into suitable groups if the Department's services are to be made available to all. In this direction the Agricultural Stations are now playing an increasing part, as stud and demonstration centres. The Co-Operative Officer's work, too, is beginning to have an effect but the task of teaching co-operation has not been found an easy one in other countries, and Barbados is no exception.

Unfortunately, continued difficulty in obtaining equipment held up the development of irrigation of peasants' holdings. Recent correspondence with firms concerned, however, has indicated that an improvement in the position may be expected in the near future.

Staff

In June, the newly-arrived Deputy Director of Agriculture took over the supervision of peasant agricultural work and the eleven Peasant Agricultural Instructors. At the same time, the Senior Instructor, seconded as Assistant Livestock Officer, was able to confine his attention to the livestock work. The eleven Peasant Agricultural Instructors continued unchanged to the end of the year. Six of these Instructors had charge of the Agricultural Stations, namely, F. E. Bynoe at the Home (St. Philip), L. T. Talma at Sayes Court (Christ Church), G. A. Ramsey at Jerusalem (St. Peter), A. Yard at Groves (St. George), C. D. Spooner at Haggatts (St. Andrew), and G. B. Pilgrim at Bullen (St. James), respectively.

In September 1946, legislation was promulgated making provision for the appointment of a Senior Peasant Agricultural Instructor in 1947-48.

Extension Work

(a) *Peasant Holdings and Cottage gardens.*

(i) It is estimated that not less than 8,000 visits to holdings and gardens were made by Instructors during the year, maintaining contacts and generally endeavouring to encourage the cottagers in better methods of crop and animal husbandry.

(ii) The Instructors continued the good work of distributing fruit trees, including citrus and dwarf coconuts, and in budding and grafting improved material on existing stocks. Many demonstrations of spraying were carried out.

(iii) Slugs were a major pest in gardens in the intermediate and high rainfall areas. In this connection, the Instructors concerned organised village demonstrations in controlling the slugs by using 'Metaldehyde'. As a result of these demonstrations, groups of peasants were encouraged to co-operate in importing adequate supplies of Metaldehyde for a comprehensive slug campaign before the next planting season, i.e. in April — May, 1947.

(iv) Owing to the lack of opportunity during the war, soil conservation methods have not received up to date the attention required in peasant cultivation in Barbados. Towards the end of the year, Instructors began to impress on owners of sloping gardens the importance of planning the lay-out of gardens with a view to preventing erosion and building up fertility. Under supervision, the Instructors themselves began to practise using a line level so that conservation planning of groups of holdings may be undertaken in the near future.

(v) On account of lack of equipment, the development of irrigation has not gone ahead as fast as we hoped. Nevertheless, Instructors continued to discuss and explain the advantages of the Colonial Development and Welfare Scheme for assisting peasants to go in for irrigation. A number of applications for assistance were examined and a start was made in St. Philip with the installation of the first of forty windmill pumping units which it is hoped to install on peasants' holdings in various parts of the Island, at the rate of about two to four per month from now on.

(vi) In connection with the Agricultural Society's Annual Exhibition, the usual two field competitions were held; (a) Peasant Vegetable Gardens, and (b) Peasant Holdings. The former is based on the Peasant Agricultural Instructors districts — three prizes are given in each district. There were seventy-four gardens entered by the Instructors for this competition, and all gardens were visited on two occasions by the judges (the Deputy Director, the Co-Operative Officer and the Plant Diseases Inspector). The standard of cultivation was remarkably good considering the rather difficult weather conditions that obtained during the year. The latter competition involved the judging of fifty-two entries as mixed farming holdings based as usual on the three areas, (a) high rainfall, (b) intermediate rainfall, (c) low rainfall. Here again competition was very keen, and some first rate holdings were seen. An interesting point was that in one district the first and second prize winners were working rented lands and putting relatively as much into the land as if they owned it.

(vii) All the extension staff worked very hard in the Grow More Food Campaign. The Deputy Director, supported on most occasions by the Co-Operative Officer, addressed fourteen public meetings organised by the Instructors in their several districts during July and August. The response on

the part of the peasants was excellent. It was unfortunate that so much of the efforts of the cultivators was dissipated by the very severe drought which characterised the year. In connection with the Grow More Food Campaign, surveys were made during August by the Instructors of a random sample comprising fifty-nine blocks of peasant holdings throughout the Island. These fifty-nine blocks included 1,608 separate plots, and measured in all 1,127 acres. 95.7 per cent. of the area was found in effective cultivation including 55.5 per cent. in sugar cane (with some interplanted with food crops), and 40.2 per cent. in other crops mainly food crops. The sample was considered representative and the result can be taken as giving a fair picture of the state of peasant holdings at the time.

(b) *School Gardens*

(i) Instructors continued the happy and successful liaison with the Headmasters of Schools in regard to the school gardens and horticultural instruction in the schools. Barbados can be proud of the generally high standard of the school gardens and credit must go to the teachers concerned. At the same time, the Peasant Agricultural Instructors have helped by their visits, talks with the teachers and demonstrations for the children.

(ii) The School Gardens' Competition in connection with the Agricultural Society's Annual Exhibition was carried out as usual. Sixty-nine school gardens were entered for the competition. The gardens were visited and judged on three occasions during the year. The excellent standard reached by some of the schools may be appreciated by the fact that the first prize winner obtained ninety-four per cent. of marks while the top seven in the list all had over eighty per cent. The standard was generally good despite the difficult weather conditions and the numerous difficulties that are peculiar to school gardens.

The Agricultural Stations

(Colonial Development and Welfare Scheme D. 217)

(a) *Introduction.*

Good progress was made during the year in the development of the six District Agricultural Stations. The Stations were started at different dates since April, 1944, as suitable sites could be purchased. They vary in size from ten to twenty acres. With the exception of pumping and irrigation equipment and several minor items, the establishment of the six Stations was practically completed by the end of March, 1947. The Instructors-in-charge have now settled down to the main task of demonstrating the Department's various recommendations for improving peasant agriculture based on mixed farming using sugar cane as the main cash crop, with other crops, and intensively managed stock consisting of cattle, goats, sheep and pigs.

At the same time, however, the Stations have served as stud centres in their respective districts, as well as demonstration and distribution centres for improved methods of agriculture, planting material and livestock, respectively. Arrangements are in hand for District Agricultural Shows and "Peasant Farmers' Days" to be held during the incoming year.

The feeding and management of all the livestock at the Stations were supervised by the Livestock Officer. The Government Veterinary Officer also paid regular visits to see the stock.

(b) *Rainfall.*

The year 1946 was relatively very dry and, as a result, the planting programmes for the Stations did not make as rapid progress as they might have done.

Monthly rainfall returns at the Agricultural Stations were as follows:—

Month 1946	The Home (St. Philip)	Sayes Court (Christ Church)	Groves (St. George)	Jerusa- lem (St. Peter)	Haggatts (St. Andrew)	Bullen (St. James)
	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
January ..	3.24	2.71	5.97	3.98	3.41	2.31
February ..	1.51	1.36	3.66	1.72	2.24	1.85
March ..	0.78	0.95	1.53	0.71	0.81	0.23
April ..	1.30	1.12	2.71	4.90	6.80	7.02
May ..	3.55	3.11	5.79	3.15	2.27	2.34
June ..	2.49	3.01	3.75	3.34	3.99	2.17
July ..	3.23	3.91	6.73	6.43	4.52	3.40
August ..	4.67	4.31	6.83	4.03	5.81	6.21
September ..	6.47	7.10	7.68	4.83	4.20	5.16
October ..	1.92	3.86	4.98	1.85	1.64	1.58
November ..	3.63	4.40	4.91	4.17	4.06	3.41
December ..	6.78	6.39	6.49	3.72	4.95	7.44
Totals ..	39.57	42.23	61.03	42.88	44.70	43.12

(c) *The Economics of Mixed Farming at the Stations.*

It is too soon to form any conclusions on the economics of the Stations, for two reasons —

(i) the establishment of the Stations was barely completed by the end of March, 1947,

(ii) the Stations have been very much over-stocked through having to hold stock destined for the Central Livestock Station.

Nevertheless, the following table of the revenue for the year under various heads is interesting as it gives some idea of the balance between crops and live-stock, and the approximate scale of the operations.

Agricultural Stations —Statement of Revenue 1/4/46—31/3/47

Station	Service Fees	Sale of Live- stock	Sale of Dairy Produce	Sale of Vegeta- bles	Sale of Sugar Cane	Sale of Other Crops	Sale of Mixed Items	Total
	£	£	£	£	£	£	£	
The Home ..	57	72	464	84	27*	—	6	710
Sayes Court ..	61	106	342	51	91	6	—	657
Groves ..	128	60	33	61	327	9	2	620
Jerusalem ..	48	74	278	27	168	16	19	630
Haggatts ..	54	46	—	34	74	55	7	270
Bullen ..	5	19	—	33	46	—	—	103
Totals ..	353	377	1117	290	733	86	34	2990

*Excluding £243 received immediately prior to the 1st April, 1946.

(d) *The Stations as Stud Centres.*

Peasant stock-owners have not been slow to take advantage of the stud animals at the Stations. This is well brought out by the figures of services which have been summarised for the period 1st April, 1946 to 31st March, 1947, as follows:—

Station	Bulls	Buck Goats	Black Bel- lied Rams	Boars	Total
The Home ..	184	165	124	121	594
Sayes Court ..	121	281	122	113	637
Groves ..	460	285	266	216	1227
Jerusalem ..	179	58	62	57	356
Haggatts ..	211	267	169	51	698
Bullen ..	—	50	32	15	97
Totals ..	1155	1106	775	573	3609

(e) *Animal Husbandry.*

This work, which has been under the supervision of the Livestock Officer, is dealt with fully in his report. For record purposes, however, the following table gives the numbers of the various classes of stock at the six Agricultural Stations:—

Census of Livestock at 31st March, 1947.

Station	Bulls	Other Cattle	Buck Goats	Other Goats	Rams	Other Sheep	Boars	Other Pigs	Mules and Don-keys	Total
The Home	3	16	3	8	2	—	1	9	2	44
Sayes Court	2	10	4	3	1	3	2	8	1	34
Groves	6	12	3	—	3	—	3	31	1	59
Jerusalem	2	15	2	1	1	—	2	16	2	41
Haggatts	2	3	2	5	1	1	1	12	—	27
Bullen	—	2	1	2	1	—	1	18	1	26
Totals	15	58	15	19	9	4	10	94	7	231

It should be noted that the stations were temporarily overstocked through having to carry stock destined for the Central Livestock Station.

(f) *General.*

It is worthy of note that a great deal of responsibility has fallen on the Instructors in charge of the Stations in looking after the livestock. Together with the work involved in handling peasants' female stock brought in for service, the general management of the Stations has considerably curtailed the extension work of the Instructors concerned. It might be said that "what is lost on the swings is gained on the roundabouts," but there is little doubt that personal contacts by Instructors on the peasants' own holdings is very important in peasant agricultural work. Whereas an Instructor without a Station could visit up to one hundred and twenty-five holdings per month, an Instructor on a Station could not find time to visit more than twenty holdings per month.

SECTION II

SUGAR CANE BREEDING AND SEEDLING TESTING

BY

B. DEL. INNISS,

Botanist, B.W.I. Central Sugar Cane Breeding Station.

1. SUGAR CANE BREEDING—B.49' AND B.48' SERIES

The usual methods were employed in the controlled crossing of various sugar cane varieties at Groves Agricultural Station from October to December, 1946. The season was exceptionally dry, and generally speaking, arrowing was light and late. Some difficulty was experienced with arrows which dried in the sheath without emerging while others emerged as a mass of dry fuzzy material in which no flowers had developed.

Germination of seedlings from the various crosses was on the whole disappointing, for although seedlings were obtained from a very good percentage of the crosses, the number of seedlings per cross was very small.

Table I gives under group heads a list of the crosses made, the number of seedlings germinated and the number potted.

TABLE I

Group	No. of crosses	No. of seedlings germinated	No. potted	No. planted in Field Nursery and/or First Year Trial
<i>S. officinarum</i> x <i>S. spontaneum</i>				
3rd Nobilisation Local	1	117	117	108
2nd " Glagah	1	300	300	223
4th " Glagah	1	4,000	300	225
2nd " Dacca	1	140	136	136
Noble x Glagah x Local	2	370	360	334
Noble x Glagah x Celebes	1	320	320	278
Noble x Glagah x Local x Celebes ..	2	995	920	741
<i>S. officinarum</i> x <i>S. spontaneum</i>				
x <i>S. barberi</i>				
Noble x Local x Chunnee	12	4,457	4,150	3,594
Noble x Glagah x Chunnee	8	3,268	2,589	2,368
Noble x Glagah x Local x Chunnee ..	26	18,507	5,964	5,514
Noble x Glagah x Celebes x Chunnee ..	10	3,293	2,183	1,955
Noble x Local x Celebes x Chunnee ..	9	4,538	3,383	2,646
Noble x Local x Glagah x Celebes x Chunnee	3	900	750	714
<i>S. officinarum</i> x <i>S. barberi</i>				
3rd Nobilisation Chunnee	1	4	—	—
<i>S. officinarum</i> x <i>S. spontaneum</i>				
x <i>S. robustum</i>				
Noble x Glagah x Robustum	2	116	100	68
<i>S. officinarum</i> x <i>S. barberi</i>				
x <i>S. robustum</i>				
Noble x Chunnee x Robustum	1	13	13	13
<i>S. officinarum</i> x <i>S. spontaneum</i>				
x <i>S. barberi</i> x <i>S. robustum</i>				
Noble x Glagah x Chunnee x Robustum	2	119	91	72
Noble x Local x Chunnee x Robustum	10	1,634	1,231	1,096
Noble x Local x Glagah x Chunnee x Robustum	3	1,349	279	222

TABLE I—Contd.

Group	No. of crosses	No. of Seedlings Germinated	No. Potted	No. Planted in Field Nursery and/or First Year Trial
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. sinense</i>				
Noble x Glagah x Sinense	1	—	—	—
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> x <i>S. sinense</i>				
Noble x Local x Chunnee x Sinense ..	2	276	250	217
Noble x Glagah x Local x Chunnee x Sinense	8	1,619	1,350	1,217
Noble x Glagah x Celebes x Chunnee x Sinense	1	110	110	85
Noble x Local x Celebes x Chunnee x Sinense	1	36	35	35
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> x <i>S. robustum</i> x <i>S. sinense</i>			36	36
Noble x Local x Chunnee x Robustum x Sinense	1	18	18	14
Grand Total	110	46,499	24,949	21,875

PROGRESS WITH SEEDLINGS OF THE B.48' AND B.s.47' SERIES

The B.48' and B.s.47' Series were bred in October, November and December 1945, and potted in January, February and March, 1946. The B.48' Series was planted in the First Year Nursery in May, 1946, and from this into the First Year Seedling Trial in December 1946. The First Year Seedling Trial is usually planted about the end of October of each year, but, owing to the exceptionally dry weather conditions at this time, planting of this trial had to be postponed to December, when conditions were more favourable. These seedlings will be reaped in 1948.

The B.s.47' Series was planted in a First Year Seedling Trial in May 1946, and these seedlings were reaped in February, 1947. The new B.s. series of seedlings has been introduced with the object of selecting early maturing or short season types of canes which are specially suited to the conditions obtaining in British Guiana, and to meet the demand from Trinidad and Jamaica for varieties for spring planting. Table II gives under group heads, a summary of the number of crosses, together with the numbers of seedlings for each group planted in the Field Nursery and in the B.48' Series First Year Trial, while Table III gives similar information for the B.s.47 Series.

TABLE II

Group	Nc. of crosses	No. plant- ed in Field Nursery	No. Plant- ed in First Year Seed- ling Trial
<i>S. officinarum</i> x <i>S. spontaneum</i>			
Noble x Glagah	5	378	515
Noble x Dacca	1	48	40
Noble x Celebes	1	150	100
Noble x Local x Celebes	2	450	300
Noble x Glagah x Celebes	2	650	550
Noble x Glagah x Local	6	960	710
Noble x Glagah x Local x Celebes	1	150	100
	17	3 086	2,315
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i>			
Noble x Celebes x Chunnee	1	300	200
Noble x Glagah x Chunnee	7	1,090	750
Noble x Local x Chunnee	12	2,090	1,588
Noble x Celebes x Glagah x Chunnee	6	1,050	700
Noble x Celebes x Local x Chunnee	4	1,230	1,000
Noble x Glagah x Local x Chunnee	21	3,580	2,663
Noble x Glagah x Local x Celebes x Chunnee	1	150	100
	52	9,490	7,001
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. sinense</i>			
Noble x Celebes x Glagah x Sinense	2	177	148
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> x <i>S. sinense</i>			
Noble x Glagah x Chunnee x Sinense	3	89	71
Noble x Glagah x Local x Chunnee x Sinense	1	87	80
	4	176	151
<i>S. officinarum</i> x <i>S. robustum</i>			
Noble x Robustum	4	510	370
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. robustum</i> x <i>S. sinense</i>			
Noble x Glagah x Robustum x Sinense	2	176	130
<i>S. officinarum</i> x <i>S. barberi</i> x <i>S. sinense</i>			
Noble x Chunnee x Sinense	1	55	41
<i>S. officinarum</i> x <i>S. barberi</i> x <i>S. robustum</i>			
Noble x Chunnee x Robustum	1	160	100
<i>S. officinarum</i> x <i>S. barberi</i> x <i>S. spontaneum</i> x <i>S. robustum</i>			
Noble x Local x Chunnee x Robustum	1	140	100
<i>S. officinarum</i> x <i>Erinanthus arundinaceous</i>			
Noble x Erianthus	1	150	100
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>E. arundinaceous</i>			
Noble x Glagah x Erianthus	1	29	20
Grand Totals	87	14,149	10,476

TABLE III
Short Season Types B.s 47' Series

Group	No. of crosses	No. of seedlings in First Year Trial
<i>S. officinarum</i> x <i>S. spontaneum</i>		
Noble x Celebes x Glagah	1	455
Noble x Glagah x Local	3	684
	4	1,139
<i>S. officinarum</i> x <i>S. barberi</i> x <i>S. spontaneum</i>		
Noble x Local x Glagah x Chunnee	3	716
Noble x Chunnee x Local	2	319
Noble x Chunnee x Glagah	2	538
Noble x Celebes x Local x Chunnee	2	663
	9	2,236
Grand Totals	13	3,375

The B.s.47' Series was reaped as First Year Seedlings in February, 1947. The seedlings were cut, bundled and laid out for inspection in the usual manner. The following data were obtained from each selection:— (i) weight, (ii) number of sound canes, (iii) number of rotten canes, (iv) percentage arrowing, and (v) juice brix values as shown by the Zeiss Hand Refractometer.

In all fifty-three selections were made. Details of the field and final selections from this trial are given in Table IV.

TABLE IV
First Year Seedlings — B.s.47' Series. Field and Final Selections

CROSS AND GROUP.	No. planted.	No. Field Selected	% Field Selection.	No. Final Selection.	% Final Selection.
<i>S. officinarum</i> x <i>S. spontaneum</i>					
Noble x Glagah x Local					
Co.421 x B.41211	494	34	7	6	1
Co.421 x B.41261	90	2	2	1	1
P.O.J. 2878 x B.41211	100	3	3	2	2
Noble x Celebes x Glagah					
B.35247 x B.3337	455	25	5	6	1
Noble x Celebes x Glagah x Local					
B.35197 x B.34104	433	29	7	7	2
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i>					
Noble x Chunnee x Glagah					
B.35207 x P.O.J.2878	293	12	4	6	2
B.39177 x B.37193	94	—	—	—	—
B.4145 x B.37193	245	11	4	1	—
Noble x Local x Chunnee					
B.35218 x B.4098	225	10	4	6	3
Noble x Local x Glagah x Chunnee					
B.38233 x B.34104	120	6	5	2	2
B.4145 x B.34104	298	17	6	4	1
Co.421 x B.4098	298	20	7	8	3
Noble x Local x Celebes x Chunnee					
B.35157 x B.4098	230	11	5	4	3
	3,375	180		53	

PROGRESS WITH SEEDLINGS OF THE B.47' SERIES

This series was bred in 1944, potted and planted in the Field Nursery in 1945, and from the latter into the First Year Seedling Trial in October of the same year. This trial was reaped in February, 1947, when a total of 366 selections were made. Seedlings obtained from the following crosses were outstanding, and gave a high percentage of selections:—

B.35247 x B.3337	B.39207 x B.34104
B.37161 x B.3337	B.40272 x B.37193
B.37161 x B.4098	B.40272 x Co.290
B.37161 x P.O.J.2878	Co.421 x B.37193

The cross B.37161 x B.4098 appeared to be particularly outstanding. The seedlings were long, thick, clean, trashed well and had good juice brix values.

PROGRESS WITH SEEDLINGS OF THE B.46' SERIES

This series was reaped as First Year Seedlings during the 1946 crop season, when 404 selections were made. These selections were multiplied at Codrington, and in October 1946, a further selection reduced this number to 270. These seedlings were planted in the Second Year Seedling Trials at the low rainfall station, Codrington (2 trials) and in duplicate trials at the high rainfall stations, Pool and Colleton. These trials will be reaped during the 1948 crop season.

PROGRESS WITH SEEDLINGS OF THE B.45' SERIES

The B.45' Series of seedlings was planted in the Second Year Seedling Trials in November 1945 at the low rainfall station, Pine (2 trials), and at the high rainfall stations, Pool and Bowmanston.

Unfortunately, both the trials at Pool and Bowmanston were burnt at the same time, and the former after the duplicate trial at the Pine had already been reaped. Further, the estate started reaping the trial without informing the Department that it had been burnt. It was therefore impossible to make any selections from this half of the B.45' Series. The trial at Bowmanston was reaped as burnt canes and selections were made from the duplicate trial at the Pine. In all 14 seedlings were selected of which three were selected for breeding purposes only. The data obtained from these together with the data from the standard varieties is given in Table V.

TABLE V

B.45' Series—Second Year Seedling Trials—Pine and Bowmanston
 Date of Reaping: Bowmanston 5—7/3/47 Pine: 10—14/4/47

Variety.	Parentage.	No. of canes (rotten)		% Arrowing		Z. H. R. Brix.		Weight (tons per acre).	
		Pine	Bowman-ston.	Pine	Bowman-ston.	Pine	Bowman-ston.	Pine	Bowman-ston.
Group VIII.									
B. 37161	Standard	142(6)	143(0)	—	43	22.8	19.6	28.12	43.09
B. 4098	Standard	160(3)	143(0)	1	40	24.0	21.7	32.85	36.98
B. 45188	B. 3354 x B. 34104	121(7)	140(0)	—	14	22.8	19.9	28.29	44.20
B. 45189	B. 3354 x B. 34104	138(6)	134(0)	—	21	25.9	20.9	31.91	39.65
B. 45200	B. 3371 x B. 34104	149(5)	146(0)	—	5	22.1	20.3	28.04	38.70
Group X.									
B. 37161	Standard	97(4)	131(0)	2	34	22.2	19.6	30.36	41.62
B. 4098	Standard	140(7)	154(0)	6	48	23.0	21.1	39.56	29.41
B. 45224	B. 3439 x 32M. Q. 579	178(12)	197(0)	—	36	22.1	20.8	33.80	40.33
B. 45229*	B. 35206 x 32M. Q. 629	124(5)	125(0)	—	11	23.2	20.5	21.28	23.48
B. 45237	B. 37161 x B. 37256	223(6)	189(0)	1	48	22.5	20.5	37.67	35.43
Group XI.									
B. 37161	Standard	122(6)	168(3)	—	49	22.1	19.4	38.96	37.88
B. 4098	Standard	160(8)	145(2)	2	68	23.6	21.4	42.82	30.87
B. 45267	B. 39254 x Co. 290	166(14)	212(1)	2	22	23.1	20.9	36.72	38.36
B. 45270	B. 4092 x B. 37193	147(8)	168(1)	—	4	23.9	20.8	35.52	41.37
Group XII.									
B. 37161	Standard	98(4)	151(0)	3	33	22.7	19.4	32.51	39.73
B. 4098	Standard	153(6)	147(0)	1	52	22.1	21.7	35.95	32.34
B. 45274	B. 37161 x B. 37254	140(5)	188(4)	—	17	22.0	19.5	25.71	35.35
B. 45277	Co. 421 x B. 34104	150(3)	193(1)	36	80	22.7	20.0	31.56	33.02
B. 45292	B. 3439 x B. (30) L. 7	137(2)	166(1)	—	75	24.2	21.9	30.53	29.67
Group XIII.									
B. 37161(a)	Standard	101(2)	170(2)	16	30	21.1	20.0	29.58	38.27
B. 37161(b)	Standard	103(0)	158(2)	11	33	21.9	19.5	29.33	40.33
B. 4098	Standard	140(4)	150(1)	7	48	22.0	20.1	27.26	25.46
B. 45304	B. 37161 x B. 37254	176(6)	218(1)	7	30	20.7	19.1	33.02	31.05
B. 45312*	B. 38272 x B. 34104	120(3)	168(3)	6	37	19.0	17.2	30.96	32.25
B. 45313*	B. 38272 x B. 34104	145(2)	186(2)	13	26	19.9	18.7	30.27	32.25

* For breeding plots only.

PROGRESS WITH SEEDLINGS OF THE B.44' SERIES

These seedlings were reaped in the Second Year Seedling Trials as plant canes during the 1946 crop at the high rainfall stations, Bowmanston and Todds, and in duplicate trials at the low rainfall stations, Codrington and the Home. Unfortunately, the ratoon trial at Bowmanston was burnt along with two other Second Year Seedling Trials and a Select Seedling Ratoon Trial and could not be reaped. This trial included the two most promising seedlings of the series, and it is very regrettable that ratoon results could not be obtained. The results of the trial at Todds made it possible to discard six seedlings on ratoon performance, and indicated that at least one seedling, B.4411, showed distinct promise of becoming a commercial cane. The seedlings of this series have been planted in the Third Year to be reaped in the 1948 crop season.

PROGRESS WITH SEEDLINGS OF THE B.43' SERIES

These seedlings were planted in the Third Year Seedling Trials in November 1945, and these were harvested during the past crop season.

This series of seedlings is perhaps the most outstanding of any series so far produced, and includes at least three seedlings which, as plant canes at any rate, appear to be definitely superior to the standard varieties under the conditions of the trials, which are representative of the major soil groups and rainfall conditions of the island. Unfortunately, the past year has been an exceptionally dry one, and may not give a true indication of the relative merits of the various varieties. However, it does indicate that these varieties are able to yield well under adverse conditions. Table VI summarises the results obtained from these seedlings at all stations:

TABLE VI
Third Year Seedling Trials—B.43' Series

Variety	Tons cane per acre						Z. H. R. Brix						per cent Sucrose in juice						Rotten canes per plot					
	Spring Hall	Kingsland	Foursquare	Carrington	Colleton	Blackmans	Spring Hall	Kingsland	Foursquare	Carrington	Colleton	Blackmans	Spring Hall	Kingsland	Foursquare	Carrington	Colleton	Blackmans	Spring Hall	Kingsland	Foursquare	Carrington	Colleton	Blackmans
B.37161	21.73	25.70	24.97	25.06	31.39	28.15	21.9	21.1	20.2	21.4	20.2	21.8	17.2	16.9	15.2	18.2	16.2	17.8	3	2	6	4	16	13
B.4098	20.84	26.89	22.13	24.42	36.99	30.61	22.4	22.3	21.5	23.4	21.8	22.8	20.1	18.0	17.0	19.3	15.9	19.1	4	2	4	2	11	16
B.4362	18.72	26.80	27.63	25.50	32.88	29.76	23.2	23.1	20.4	23.1	22.3	24.6	20.2	19.3	18.9	19.4	18.0	20.7	16	6	7	11	21	9
B.43337	25.77	32.17	27.70	27.65	38.68	35.26	19.8	20.3	20.5	20.6	20.4	21.8	17.2	17.3	16.6	17.2	15.5	18.2	2	2	6	3	13	8
B.43391	24.91	26.38	29.69	25.09	42.25	42.01	21.2	20.8	19.2	21.3	20.6	22.2	17.4	17.5	16.3	17.4	16.1	18.3	6	5	3	1	12	10

The Seedling B.4362 is derived from the cross B.37161 x P.O.J.2878. It is a long green cane of medium thickness, which trashes well and has a very good juice. The yield of cane is not as good as that of the other varieties, but it may be expected to perform better in more normal years. It has the disadvantage of arrowing freely, particularly in the high rainfall areas.

The Seedling B.43337 is derived from the cross B.35247 x B.3337. It is a reddish brown cane with prominent nodes and the rind is inclined to split and have rough patches on it. Its juice is in much the same class as that of B.37161, while it gives a very heavy yield of cane, particularly in the low and intermediate rainfall areas. It trashes fairly well, but has the disadvantage of arrowing very freely, particularly in the high rainfall red soil areas.

The Seedling B.43391 is derived from the cross B.35247 x B.3337. It is a red cane of medium width, very much like B.34104, but without the rough brown splashes on the rind displayed by the latter. It trashes easily and arrowing is sparse, even in the high rainfall red soil areas. Its juice is in much the same class as that of B.37161 but it appears to be capable of giving very much heavier yields of cane.

All of these varieties germinate very readily; B.43337 and B.43391 cover in early and rapidly. B.4362 resembles its parent B.37161 very much in habit, and will probably perform much better in years of normal rainfall.

Two other seedlings of this series which are worthy of mention are B.43229 and B.43235. The former has an exceptionally good juice, while the latter is a thick red cane which drops its trash exceptionally well. Both of these seedlings are derived from the cross B.3365 x B.34104 and much was expected of B.43235 which performed exceedingly well as plants and ratoons in the Second Year Seedling Trials.

PROGRESS WITH SEEDLINGS OF THE B.42' SERIES

Only three of these seedlings of this series were considered worthy of trial. One of these was included in the Select Seedling Trials reaped in 1946, but was hopelessly outclassed. The other two seedlings germinated so poorly that it was impossible to include them in these trials. These were multiplied and included in the Third Year Seedling Trials along with the B.43' Series. Here again they proved to be poor germinators and will not be tested further.

PROGRESS WITH SEEDLINGS OF THE B.41' AND EARLIER SERIES

A. THE SEEDLINGS TESTED

Select Seedling Trials

Plant Canes	— B.34104, B.37161, B.4098, B.40105, B.41211 and B.41227.
First Ratoons	— B.34104, B.37161, B.4098, B.41211, B.41227.
Second Ratoons	— B.37161, B.41211 and B.41227.

B. AN ECOLOGICAL CLASSIFICATION OF THE TRIALS—TURNER'S CLASSIFICATION

This classification was proposed by Turner after a study of the sugar cane soils of the British West Indian Colonies, and is as follows :—

- I. Soils with a natural tilth and free natural drainage which require neither to be ploughed nor drained.

(a) Low Rainfall Areas.

Select Seedling Trials

Plant Canes — Mangrove and Golden Grove.

(b) Intermediate Rainfall Areas.

Select Seedling Trials

Plant Canes — Ridge.

II. Soils with a tilth that can be improved by ploughing, but which do not require to be drained.

(a) Low Rainfall Areas.

Select Seedling Trials

Plant Canes — Six Mens.

(b) Intermediate Rainfall Areas.

Select Seedling Trials

Plant Canes — Waterford.

1st Ratoons — Portland.

2nd Ratoons — Alleynedale.

(c) High Rainfall Areas.

Select Seedling Trials

Plant Canes — Lancaster and Mt. Wilton.

1st Ratoons — Andrews.

III. Soils which require to be drained, but are preferably left unploughed

IV. Soils of poor natural tilth in which a tilth can be created by ploughing, but which require to be drained to maintain their tilth.

(b) Intermediate Rainfall Areas.

Select Seedling Trials.

Plant Canes — Bulkeley.

Category I (a) Golden Grove and Mangrove — Plant Cane.

The trial at Golden Grove was far from being ideal as the variation in yield from block to block was excessive. The differences between mean yields were highly insignificant, and no useful purpose can be served by considering the results. The trial at Mangrove on the other hand proved to be very good and the results were highly significant. B.41211 was the outstanding cane in this category, outyielding the standard varieties B.37161 and B.4098 by approximately 4.5 tons of cane and 0.75 tons of sugar to the acre. B.41227 gave the lowest yield, and was beaten significantly on cane and sugar by B.37161, B.4098 and B.40105. There was little to choose between the juice qualities of B.37161, B.4098, B.40105 and B.41211. The juice of B.41227 was higher in sucrose than any of the other varieties tested.

Category I (b) Ridge — Plant Cane.

In the trial at Ridge, B.41211 gave the highest and B.37161 the lowest yield of cane, while B.4098 gave the highest and B.37161 the lowest yield of sugar. There was little to choose between the cane yields of B.4098, B.41211 and B.41227. B.4098 was richest in sucrose, closely followed by B.41227.

Category II (a) Six Mens — Plant Cane.

At Six Mens, B.41211 again gave the highest yields of cane and sugar and B.37161 the lowest. There was nothing to choose between the yields of B.4098 and B.41227. B.4098 was richest in sucrose, closely followed by B.41227. There was little to choose between the juice qualities of B.37161 and B.41211.

Category II (b) i Waterford — Plant Cane.

This trial was unfortunately burnt, and one block was reaped in error by the plantation labour. There was little to choose between the cane yields of B.4098, B.41211 and B.41227. However, both B.4098 and B.41227 gave nearly half a ton more sugar per acre than B.41211 and nearly one ton more than B.37161. It was not possible, however, to show that any of these differences were statistically significant. There was little to choose between the sucrose content of B.4098 and B.41227, while the sucrose contents of B.37161 and B.41211 were also similar.

(ii) Portland — 1st Ratoons.

In this trial B.41211 gave the highest yield of cane, closely followed by B.37161 and B.41227. B.4098 gave the lowest yield. The differences between the mean yields however cannot be established to be significantly different. B.4098 gave the juice of best quality as revealed by the Zeiss Hand Refractometer. There was little to choose between the juice qualities of B.37161 and B.41227.

(iii) Alleynedale — 2nd Ratoons.

In Group I, B.41211 slightly outyielded B.37161 on second ratoon cane, while B.37161 had the better juice.

In Group II, B.41227 outyielded B.37161 by an average of 4.5 tons of second ratoon cane per acre, and in addition had juice of better quality.

Category II (c)

(i) Lancaster and Mount Wilton — Plant Canes.

The trial at Lancaster was unfortunately burnt, and had to be reaped rather early in crop, so that the juices were not as good as they might have been. In this trial B.4098 gave the heaviest yield of cane, closely followed by B.41227. B.37161 and B.41211 gave approximately 3 tons and B.34104, 9 tons of cane per acre less than the two former varieties. However, both B.41211 and B.34104 had been severely damaged by rats. On sugar yield, B.4098 and B.41227 outyielded B.37161 and B.41211 by nearly one ton per acre, and B.34104 by nearly 2.5 tons per acre. B.4098 and B.41227 gave cane of the highest quality, and there was little to choose between these varieties. B.41211 was better than B.37161, which in turn was better than B.34104.

At Mount Wilton, B.41211 gave the heaviest yield of cane, and B.34104 the lowest. The differences between mean yields were, however, not significant. On sugar, B.41211 gave the heaviest yield and B.4098 the lowest. Here again the differences between mean yields cannot be shown to be significant. B.34104 and B.41211 gave cane of the highest quality, and B.41227 cane of the lowest quality. There was little to choose between B.37161 and B.4098 as far as cane quality is concerned.

(ii) Andrews — 1st Ratoons.

In this trial, B.41227 gave the heaviest yield of ratoon cane, followed by B.37161. Both of these varieties were significantly better than B.34104, B.4098 and B.41211. B.41211 was very severely damaged by rats in this trial, an average of 159 rotten and rat eaten canes having been picked up per plot. B.37161 gave juice of the highest and B.41227 juice of the lowest quality. There was little to choose between the juices of B.34104, B.4098 and B.41211.

Category IV (b). Bulkeley — Plant Cane

In this trial, B.4098 gave the largest, and B.37161 the smallest yield of cane. The differences however failed to be significant. On sugar, B.4098 gave the heaviest yield, very closely followed by B.41227 and B.41211. B.41227 gave cane of the best quality. There was little to choose between the cane quality of the other three varieties.

SUMMARY AND CONCLUSIONS

In the low and intermediate rainfall black soil areas, the variety B.41211 has, in the absence of rat damage, given the heaviest yields of cane and sugar. This is closely followed in the intermediate rainfall areas by B.4098.

In the red soil, intermediate rainfall areas, B.41211, B.41227, B.4098 and B.37161 have all proved to be good. B.4098 and B.41227 have better juices as a general rule than B.37161 and B.41211.

In the high rainfall red soil areas, B.41227 has done very well indeed, particularly as a ratoon crop. B.41211 would also have done well, but invariably the yield has been adversely affected by rat damage which can be very severe in relatively small plots. B.4098 appears to arrow very freely in this category and is never at its best. In spite of this it has given some very good yields.

It is proposed to distribute planting material of B.41211 and B.41227 during the coming planting season so that these varieties can be tried on a plantation scale and in order that the factories may be able to obtain experience with their milling qualities.

MOSAIC DISEASE INVESTIGATIONS

The seedlings of the B.42' and B.43' Series were tested for resistance to mosaic disease by artificial inoculation, making use of the Sein method which has been under trial for the past few years. The following seedlings proved to be susceptible to the disease :— B.42114, B.4374, B.43127, B.43133, B.43235, B.43275, B.43330, B.43336, B.43358, B.43380, B.43388, B.43391.

The season was very dry, and relatively cool, and although all plants were given a period of high humidity before and after inoculation, the "take" obtained was by no means satisfactory. A series of 200 Ba.11569 plants which were inoculated at the same time to serve as a check only gave a take of just over 40%. This is in contrast to 100% take obtained when plants were inoculated in the open in 1944.

SECTION III.

BOTANY

By

D. M. HANSCHHELL,

Botanist.

Propagation and Distribution of Ornamental Plants

The propagation and distribution of ornamental plants was resumed during the year. The number of plants distributed is given in Table I.

TABLE I

No. of Orders	No. of Species Distributed	No. of Plants distributed
96	26	2,346

Owing to the fact that it was not possible to maintain the ornamental Garden at Codrington during the war years, some difficulty was experienced in obtaining plant material for propagation and it was mainly due to the kindness of several owners of private gardens in supplying material that many of the orders for ornamental plants were fulfilled.

Distribution of Vegetable Seeds from the Department's Offices

This distribution aims at encouraging the purchase of seed of vegetable varieties which are known to be suited to local conditions. The Department purchases these seeds from reliable firms and sells them in small quantities at cost price.

Doubtless as a result of the greater number of vegetable gardens which are now kept by small holders, this service has increased greatly. The distribution of seeds with amounts during the year together with that for 1938-39 is set out in Table II.

TABLE II

Seed		Variety	Amount (lb.)	
			1938-39	1946-47
Beans	.. ..	Bountiful	680	4600
Beet	.. ..	Eclipse	22	—
"	.. ..	Detriot Dark Red	—	159
Cabbage	.. ..	Danish Ball Head	4½	11
"	.. ..	Late Flat Dutch	2¾	8
"	.. ..	Copenhagen Market, Surecrop, ..	—	—
"	.. ..	Wakefield Charleston	—	4¾
Carrot	.. ..	Danvers Half Long	5¼	213
"	.. ..	Oxheart	4¼	10
"	.. ..	Chantenay	3¾	12
"	.. ..	Nantes	—	2

Seed	Variety	Amount (lb.)	
		1938-39	1946-47
Cauliflower	Early Patna	1	—
"	Early Market	1	7
Eggplant	Black Beauty	—	1¼
Kohl Rabi	Early White Vienna	—	4½
Lettuce	Mignonette	4¾	40
Parsley	Emerald & Triple Moss Curled ..	—	8
Raddish	White Icicle	—	2
Swiss Chard	Lucullus	—	2
Tomato	Marglobe	3¾	25¾
Turnip	Purple Top White Globe	—	3
		733	5113¼

Propagation and Distribution of Economic Trees

(a) *Citrus*. Eight types of citrus were propagated and distributed, i.e. lime, orange, grapefruit, shaddock, lemon, mandarin, pomelo and citron. The scion material consisted chiefly of budwood from local vigorous seedling trees and to a less extent of commercial varieties imported from Trinidad and established in the orchard at Codrington Experiment Station. The stock used was sour orange grown from seed imported from Trinidad and St. Lucia.

During the year one thousand and forty budded citrus plants were distributed at a price of six cents to peasants and twenty-five cents to others.

TABLE III

Distribution of Economic Trees

Species	Varieties	Total Number of Plants Delivered	
		1938-39	1946-47
Citrus			
Citron	Trinidad	5	8
Grape fruit	Foster, Duncan, Marsh, Walters, Claybury Nos. 1 and 2	133	199
Lemon	Claybury and Layne House	32	26
Lime	Claybury, Codrington, Tahiti, Lisbon	193	323
Mandarin	Claybury Nos. 1, 2, and 3, Dancy Tardiff, Parson Brown, Navel, Wilkie, Ruby, Pineapple, Claybury Nos. 1, 2 and 3, Layne House Nos. 1 & 3, Clapham, Barnardo	15	57
Pomelo	Codrington	162	302
Shaddock	Burkes Village, Claybury Nos. 1 and 2	14	23
		30	102
		584	1,040
Avocado Pears	Claybury Nos. 1, 2, and 3, Frere Pilgrim Nos. 1, 2, 3, 4, 5, and 6, Carrington	75	69
Miscellaneous			
Breadfruit		42	6
Barbados Cherry		—	34
Guava		60	42
Fig		37	4
Golden Apple		—	19
Grape		—	4
Pawpaw		—	5
Coconuts	Dwarf	3,156	3,360
		3,954	4,583

A nursery of approximately 3,500 sour orange stocks has been established to provide budded plants for next year.

For the purpose of supplying scion material, an orchard of twenty-three citrus varieties is maintained at Codrington Experiment Station.

(b) *Avocado Pear*. Propagation is carried out by budding and grafting. During the year sixty-nine budded trees of local varieties were distributed (Table III) and two thousand seeds were planted to provide stocks for next year.

(c) *Dwarf Coconuts*. Coconuts of the 'Dwarf' variety, which come into bearing in three to five years, were imported from St. Lucia and distributed. During the year 3,360 nuts were distributed, bringing the total number distributed during the past six years to approximately 20,000.

(d) *Mango Top-Working*. The greater part of this work has now been taken over by the Peasant Agricultural Instructors and during the year only six trees were top-worked by the Fourth Agricultural Assistant.

MINOR CROPS

(a) *Maize*. Mass selection in the field of three types of maize, namely Barbados, Hawaii and Trinidad, was continued. No field trials were carried out.

(b) *Cowpeas*. A field trial to compare seven varieties introduced from Jamaica with the two local varieties "Blackeye" and "Rounceval" and the imported variety Dixie Queen had to be abandoned owing to poor germination. Sufficient seed was obtained for a resowing during the next growing season.

Seed of the variety Dixie Queen was distributed to three of the District Agricultural Stations and has given excellent yields. This variety is 2—3 weeks earlier than the local varieties.

(c) *Tomatoes*. A small trial comparing the yield of the standard variety Marglobe with seventeen progenies of crosses between the local small tomato with Marglobe and Ponderosa was carried out during the dry season October to January. Several progenies gave yields exceeding that of Marglobe, although the fruit averaged only one third the size of Marglobe.

Seven progenies were selected for further testing during the coming wet season and for back-crossing with Marglobe to improve size of fruit.

FODDER CROPS

(A) GENERAL

At present Guatemala grass (*Tripsacum laxum*) is the best perennial fodder on the basis of yield, resistance to drought and freedom from diseases and insect pests. Where fodder and not material for mulching is required, much of the marginally arable land which at present is usually retired to sour grass (*Andropogon pertusus*) could, with advantage, be planted in Guatemala grass.

For soiling or ensiling the best short term fodder is the local strain of Guinea corn (*Sorghum vulgare*) and it is usual to obtain at least two and with favourable rainfall three cuttings from this crop.

(B) SHORT TERM FODDER CROPS

(1) *Maize*. A field trial with three types of maize, namely, Barbados, Hawaii and Trinidad, planted in June and reaped in September, gave the following mean yields of green matter when cut at the milk stage.

TABLE IV

Variety	Yield Tons Per Acre	No. of days planting to cutting	Rainfall
Barbados ..	10.25	90 100	15.97 inches
Hawaii ..	10.14		
Trinidad ..	8.04		

(2) *Gram (Phaseolus spp.)*. The following mean yields of green matter were obtained from a field trial in which four varieties of gram were compared.

TABLE V

VARIETY.	Mean Yield Green Matter Tons per acre.	No. of days planting to cutting.	Rainfall (Ins.)
Gram 23 (<i>Phaseolus aureus</i>) ..	8.46	72	15.09
Woolly Pyrol (<i>Phaseolus mungo</i>)	7.78		
Gram 8 (<i>Phaseolus trinervius</i>) ..	5.00		
Gram 7 (<i>Phaseolus aureus</i>) ..	4.83		

Gram 23 was earlier maturing than any of the other varieties and had set seed at the time of cutting. It should have been cut at an earlier stage.

The following results were obtained from samples analysed:—

TABLE VI

Variety.	Per Cent Dry Matter.	Analysis of Dry Matter %				
		Ash.	Fibre.	Oil.	Protein.	Carbohy- drates.
Gram 23 ..	16.3	11.3	34.6	1.0	21.8	31.3
Woolly Pyrol ..	13.4	18.1	29.9	1.1	21.3	29.5
Gram 8 ..	12.1	16.9	34.6	1.2	22.9	24.3
Gram 7 ..	10.8	16.8	30.1	1.8	17.7	33.6

(C) GRASSES

(1) *Sour Grass—Legume Manurial Trial—Union, St. Philip.*

Since 1945 the following treatments have been applied to a sour grass meadow at Union, St. Philip, in which a high proportion of leguminous species, mainly *Teramnus labialis* and *Clitoria ternatea*, occur.

Treatment

1. Cut twice per year — No manure.
2. Cut three times per year — No manure.
3. Cut twice per year — One application of 2 cwt. Sulphate of Ammonia + $\frac{1}{2}$ cwt. Superphosphate + $\frac{1}{2}$ cwt. Muriate of Potash per acre.
4. Cut three times per year — One application of 2 cwt. Sulphate of Ammonia + $\frac{1}{2}$ cwt. Superphosphate + $\frac{1}{2}$ cwt. Muriate of Potash per acre.
5. Cut three times per year—Two applications of 1 cwt. Sulphate of Ammonia + $\frac{1}{4}$ cwt. Superphosphate + $\frac{1}{4}$ cwt. Muriate of Potash per acre.
6. Cut three times per year—Two applications of 2 cwt. Sulphate of Ammonia + $\frac{1}{2}$ cwt. Superphosphate + $\frac{1}{2}$ cwt. Muriate of Potash per acre.

Total plot yields of green herbage are given in Table VII.

Table VII. Total Yields Green Matter — Tons per acre

1945		1946		Combined Totals 1945-46	
Treat- ment	Yield	Treat- ment	Yield	Treat- ment	Yield
5	14.65	6	7.46	6	21.87
6	14.41	3	7.29	5	21.84
4	14.36	4	7.26	4	21.62
2	12.79	5	7.19	2	18.20
1	6.30	1	6.20	3	12.98
3	5.69	2	5.41	1	12.50
	68.20		40.81		

Significant difference between plot totals	= 0.46 tons per acre
" " " combined plot totals	= 3.02 " " "
" " " yearly totals	= 0.52 " " "

From the above results it may be seen that in the first year those plots receiving manure and cut three times per year are significantly better than all others but not from each other, and the treatment receiving no manure but cut three times per year is significantly better than either of those cut twice per year whether manured or not.

In the second year the yields of all treatments which were cut three times per year are considerably reduced. There is no significant difference between treatments receiving manure but they are all significantly better than those which

received no manure. Of the no manure treatments, that cut only twice per year is significantly better than that cut three time per year. When the combined yields for the two years are considered the order of merit is the same as that of the first year.

At each cutting, random samples were taken from each plot for analysis and the determination of the proportion of leguminous species in the green herbage. The results are given in Table VIII.

TABLE VIII

Date of Cutting	Legume — % of Green Herbage	Analysis of Mixed Herbage— Per Cent. Dry Matter						Analysis of Sour Grass— Per Cent. Dry Matter					
		Moisture	Ash	Ether Extract	Carbohydrate	Fibre	Protein	Moisture	Ash	Ether Extract	Carbohydrate	Fibre	Protein
Oct. 1944	56	57.3	9.5	1.8	48.5	32.4	7.7	48.0	10.6	1.8	54.0	30.6	3.0
Jan. 1945	23	52.8	12.6	1.6	48.8	31.1	5.7	51.3	13.6	1.6	49.7	31.1	3.7
July „	18	62.8	11.0	1.9	47.2	33.3	6.4	60.6	11.3	1.9	48.7	33.3	4.7
Oct. „	55	57.0	9.1	2.2	44.1	35.1	9.5	50.5	8.9	2.1	49.1	35.3	4.5
Jan. 1946	30	40.0	9.6	2.0	48.9	32.1	7.2	36.7	9.3	1.9	51.4	32.8	4.3
Aug. „	—	49.5	8.1	2.0	52.0	32.1	5.9	—	—	—	—	—	—
Dec. „	25	—	—	—	—	—	—	—	—	—	—	—	—

*Initial reaping before application of manures.

From the above results it would appear that the presence of leguminous species improves the feeding value of the sour grass considerably. There is a decrease in the proportion of leguminous species during 1946, but this might be due to the considerably lower rainfall in 1946 as compared with 1945 or 1944.

There were no apparent differences between the various treatments either in the proportions of leguminous species or in the analysis of the herbage.

(2) Introduced Grasses.

Planting material of seventeen species of pasture and/or forage grasses was introduced from the Imperial College of Tropical Agriculture during the early part of the year and established in nursery plots.

Two species of Star Grass (*Cynodon sp.*) were destroyed as potential weeds.

The following twelve species are now established in observation plots of approximately 1/60 acre:—

Brachiaria dictyoneura
 „ *decumbens*
 „ *brizantha*

<i>Chloris gayana</i>	— (Rhodes Grass)
<i>Eriochloa polystachya</i>	— (Malojillo)
<i>Hyparrhenia rufa</i>	— (Jaragua grass)
<i>Panicum spectabile</i>	— (Coloniao „)
<i>Paspalum dilatatum</i>	— (Dallis „)
<i>Pennisetum purpureum</i>	— var. Merker
„ „	— „ Florida
„ „	— „ Uganda
<i>Pennisetum</i> x Millet	— Hybrid

Of the above, the Merker Grass and Coloniao Grass appear at present to be most promising.

(D) LEGUMES

(1) *Alfalfa*. Observation plots of the variety Hairy Peruvian were maintained at Codrington and at the Home Agricultural Station.

This crop continues to show promise where a minimum of irrigation is available during the dry season. Except for the occasional appearance of a leaf miner which is kept in check by cutting, no major pest or disease has been noted. The total yield of green matter from a plot of approximately one-thirtieth of an acre at The Home Agricultural Station for a period of eleven months was twenty tons per acre.

(2) *Introduced Legumes*. The following have been established in observation plots at Haggatts Agricultural Station in the Scotland district:—

- (i) *Indigofera subulata*
- (ii) *Pueraria phaseoloides*
- (iii) *Centrosema pubescens*
- (iv) *Calopogonium muconoides*

Attempts at establishing *Stylosanthes guianensis* have failed.

LAWN GRASSES

Three lawn grasses, *Cynodon transvaalensis*, *Zoysia matrella* and *Eriochloa ophiuroides*, were introduced from the Imperial College of Tropical Agriculture. None of these appear suited to local conditions.

A small lawn of Java Grass (*Polytrias racemosa*) has been established at Codrington Botanic Station. This grass forms an attractive, close springy turf and keeps remarkably free of weeds but becomes very dry and brown during the dry season.

AFFORESTATION

(a) *Distribution of Casuarinas*. The free distribution of young casuarina trees in pots was continued, and a total of 12,519 were delivered during the year.

Within the past five years over 250,000 trees have been distributed and although it is not possible to say what proportion of these have been established several small plantations are in existence, notably at Dover, Christ Church, Claybury and Bath, St. John, Mount Brevitor and Alleynedale, St. Peter, Walkers, St. Andrew, Walkes Spring, St. Thomas, and Belle, St. Michael.

During the year, sample girth measurements and observations on growth and habit were made on several of these plantations in different ecological areas.

(b) *Government Casuarina Plantations at St. Ann's Fort and Needham's Point.* From plantings made in 1941, 1263 trees at St. Ann's Fort and 954 trees at Needham's Point have been established, spaced at ten feet apart. During the period under review the area at St. Ann's Fort was divided into blocks and thinnings were made on four separate systems. Details of yield per block are given in Table IX.

The total yield of stem wood amounted to forty-five tons which, at the present price of firewood of \$12.00 per ton is worth \$540.00. The cost of felling and loading carried out by day labour amounted to \$2.40 per ton.

TABLE IX

Block	Number of Established Trees	Number of Trees Felled	Weight of Stem Wood			Weight of Branch Wood (Untrimmed)			Mean weight per tree Stem Wood (lbs)	Mean weight per tree (feet)	Mean Circum- ference at 18 ins. above ground level (ins)
			Tons	Cwt.	lbs.	Tons	Cwt.	lbs.			
I	291	99	9	3	9	5	5	20	207	33	18
II	269	133	9	0	70	7	17	6	152	28	19
III	215	70	8	7	41	5	3	54	268	40	23
IV	251	129	18	11	43	9	6	88	322	47	23
V	237	—	—	—	—	—	—	—	—	—	—
Total	1263	431	45	2	51	27	12	56	235	37	21

(c) *Reclamation of Eroded Hillsides.* (Colonial Development & Welfare Scheme D.50.) The two eroded hillsides at Haggatts Agricultural Station, St. Andrew, were maintained during the year.

On the first, eighteen different species of trees were planted in 1942. The majority of these have grown well, the growth of *Prosopis juliflora* being outstanding and, in addition, an excellent natural ground cover, with Guinea Grass, *Cassia polyadena* and *Abrus precatorius* dominating, has been established. What was once a semi-denuded area is now almost completely healed.

The second hillside was acquired in 1945 and an attempt has been made to keep the area free of man and beast in order to encourage the growth of a natural cover. No trees have been planted. Up to the present there has been no noticeable improvement in the vegetative cover.

(d) *Treatment of Semi-denuded Sour Grass Meadow on a Steep Slope.* Out of thirty-two plots of trees which were planted in 1943 on the sour grass meadow at Parks, St. Andrew, only a single plot of *Albizia lebbek* has survived.

EXPERIMENTS WITH SELECTIVE WEED KILLERS

Several preliminary experiments have been carried out with the two selective weed killers Methoxone (2-methyl-4 chloro-phenoxy-acetic acid) and 2-4-D (2 : di-chloro-phenoxy-acetic acid).

Both chemicals were applied as a spray at rates varying from one pound to eight pounds of chemical per acre. Tentative conclusions reached were that:—

1. There appears to be little difference in the effectiveness of the two chemicals used.
2. Although several weeds, for example Pond Grass (*Commelina sp.*), Purseley (*Portulaca spp.*), Loggerhead (*Spigelia anthelmia*), and *Amaranthus spp.* were completely killed at the lower rates of application, others such as Carpet Weed (*Wedelia gracilis*), Rabbit Vine (*Teramnus labialis*), *Desmodium sp.*, *Aeschynomene americana* and *Borreria laevis* are comparatively resistant, even to applications of eight pounds of chemical per acre.
3. With Nut Grass (*Cyperus rotundus*), the above-ground portions are readily killed by applications of 1—2 pounds per acre, but on land which is heavily infested with this weed there is a rapid regrowth within six to eight weeks. The new growth takes place from the underground tubers which are not apparently affected by the chemical.
4. In none of the tests carried out were any of the true grasses (*Gramineae*) affected, even at the higher rates of application.

SERICULTURE

During the year under consideration, approximately three thousand Osigian mulberry cuttings were received through the courtesy of the British Caribbean Silk Company, Limited, of Nassau. With a view to determining their growth under local conditions, trees have been established at the following places:—

Codrington Experiment Station	620 trees
Haggatts Agricultural Station, St. Andrew	1,250 „
Jerusalem Agricultural Station, St. Peter	223 „
Sayes Court Agricultural Station, Christ Church	321 „
The Home Agricultural Station, St. Philip	107 „
	2,521

All of the trees have grown poorly and it would seem that it is unlikely that they will thrive under local conditions except, possibly, on well sheltered sites.

SECTION IV

CHEMISTRY

BY

F. H. B. BLACKBURN

Chemist

MANURIAL TRIALS WITH SUGAR CANE

Publications:

Department of Science and Agriculture Bulletin No.7, "Manurial Trials with Sugar Cane" was prepared and published. In this Bulletin are described the results of the following experiments:—

- (i) The effect of nitrogen, potash and phosphate on the yield of cane and percent sucrose in juice of ratoons (1937—38) and plant canes (1936—38).
- (ii) A comparison of the effects of (a) nitrate of potash, (b) muriate of potash plus sulphate of ammonia and (c) muriate of potash plus nitrate of soda on the yield of ratoon canes (1938—39, 1939—40).
- (iii) The effect of nitrogen, potash and ground limestone on the yield of cane and per cent sucrose in juice (1937-39).

Trials Reaped:

(i) Trials carried out since 1926 have, by and large, resolved the manurial requirements of cane grown on coral limestone soils in Barbados. Similiar information is now being sought for the Scotland district. To this end a trial was laid down at Joes River in 1946 and reaped for the first time, as first ratoons, in 1947.

The trial is exploratory and designed to show the effects of all possible combinations of nitrogen, phosphate and potash, at one level, on the yield of cane and on the sucrose content of the juice.

The following yield results were obtained:—

Treatment	Yield (tons per acre) (means of 6)	
1. Control	18.01	
2. P	18.62	} no significant increase over control
3. K	20.05	
4. P K	19.40	
5. N	27.50	} significant increase over treatments 1 to 4
6. N K	26.60	
7. N P	30.90	} significant increase over treatments 5 and 6
8. N P K	31.31	

Where N = 2 cwt. per acre sulphate of ammonia

P = 2 cwt. per acre superphosphate

K = 2 cwt. per acre muriate of potash

Variety: B.37161

Lay-out: randomised blocks.

As will be seen from the above Table, sulphate of ammonia, applied at 2 cwt. per acre, has increased the yield of cane by 9.49 tons per acre while superphosphate applied at the same rate as, and together with, the sulphate of ammonia, has caused a further increase of 3.4 tons of cane per acre.

Manurial treatment had no significant effect on the sucrose content of the juice.

The trial will be reaped as Second Ratoons in 1948.

(ii) Trials laid down at red and black soil centres in 1944, designed to show the effect of heavier applications of sulphate of ammonia on the yield of the newer varieties B.37161 and B.34104, when compared with B.H. 10 (12), were reaped as first ratoons in April, 1947.

The treatments were:—

- (1) control
- (2) old manurial recommendation
- (3) as for (2) + 1 cwt. sulphate of ammonia per acre
- (4) as for (2) + 2 cwt. sulphate of ammonia per acre.

In view of the lack of rain in the growing season, the failure of the canes profitably to use the increased applications of sulphate of ammonia was expected. It will be remembered that, following the moderate rainfall year of 1945, treatment (3) proved better than treatment (2) when the experiment was reaped as plant cane in 1946.

One most interesting feature of the 1947 results is that, comparing those plots which received the standard application of manure at the red soil centre, the B.H. 10 (12) average yield was 19.54 tons per acre, whereas that of B.37161 was 33.62 tons per acre. Further, the average yield for the estate — largely planted in B.37161—was in the region of 32 tons per acre at the time of reaping the experiment. That is, under identical conditions, with the same manurial treatment and in an 'average' field, B.H. 10 (12) yielded 19.54 tons per acre compared with B.37161's 33.62 tons per acre. It is not stretching the imagination too far, then, to suggest that, in the absence of the newer nobilised seedlings, and following the poor rainfall of the 1946 year, an estimate of the Island's crop would be in the region of 75,000 tons of sugar instead of the 112,000 tons expected.

Trials Laid

Three manurial trials laid down in 1947, will be reaped in 1948:—

(i) A repetition of the trial at Joes River, described above, is to be reaped as second ratoons in 1948.

(ii) The effect of later and/or heavier applications of sulphate of ammonia on yield, and particularly on the juice quality of ratoons to be reaped towards the end of the crop season, is being investigated in a trial at Pine Plantation (see Bulletin No. 7, Department of Science and Agriculture, 1947).

(iii) Analysis of soil samples taken from Groves Agricultural Station showed that reserves of exchangeable soil potash (0.0324% as K_2O) were considerably in excess of the limiting value (0.014% as K_2O) for sugar cane growth on Barbados coral limestone soils (see Annual Reports, Department of Science and Agriculture, 1929-30). A trial has been laid down on Second Ratoon canes at this Station to ascertain the effect on yield of cane and the

sucrose content of the juice of omitting potassic manuring for one year. Plots of caneholes each have been arranged in the A B B A layout of "Student."

Future Work:

A scheme of manurial trials to be carried out during the next few years has been prepared. Included in these trials, and not already described in this report, are:—

(i) A trial to test the yield effect of heavy application of nitrogenous and phosphatic manures, in combination, at both red soil and Scotland soil centres, and

(ii) a trial to determine the effect of nitrate nitrogen on the yield of ratoon cane.

DEVELOPMENTS IN SUGAR AGRONOMY

(a) *Soil Conservation:*

With the introduction of dry season mechanical ploughing, conditions favourable to an accelerated rate of soil erosion have been created. The threat of erosion on undulating areas will be removed only when the old-fashioned canehole is replaced by the contour furrow. Change from the canehole system has been handicapped by the fact that the standard unit for measuring the work done — particularly cane-cutting — is 100 caneholes. Any departure is regarded with suspicion by the field worker. In 1946, however, payment for cane cutting was, for the first time, on a tonnage basis. Consequently, several fields on plantations have been laid out in contour furrows, parallel to drains (gradient 1 : 100) or bunds at 6' vertical intervals (see P. E. Turner, Report on Development in Sugar-cane Agriculture in Barbados with Special Reference to Methods of Tillage, Drainage and Contour Cultivation, 1945).

Contour furrows are preferable to caneholes for three reasons:

1. They are much more effective for soil and moisture conservation:
2. They are much cheaper to prepare, whether by hand or mechanically:
3. They allow the use of mechanically propelled cultivation equipment.

Contour drains and bunds have been laid out in fields prepared in caneholes where the planter felt himself to be not yet in a position to adopt furrow planting. These drains and bunds will afford a measure of protection, but by themselves they cannot be expected to give the full benefits of a contour system.

While the adoption of some form of contour work on sloping land cannot yet be said to be island-wide, it is gratifying to note that on several estates at which demonstrations had been laid down by Officers of the Department, the principles of contour cultivation have been applied, to other fields, by the planters themselves.

With the successful reaping of the 1947 crop, remuneration for cane cutting again being on a tonnage basis, the furrow planting of cane is expected to extend rapidly.

The urgency of the problem cannot be stressed too strongly, for already land is being ploughed mechanically and then planted to cane, with neither caneholes nor furrows. While such measures might not give rise to undue erosion in the dry years experienced recently, a repetition of the 1938 rainfall could not fail to bring disaster. Although details of the soil conservation

methods being used possibly might require slight modification in the light of further experience, such methods must be "pushed" with the utmost vigour.

(b) *Method of Planting :*

At one estate, (St. George's Valley Soil Type) continuous planting is being tried. In continuous planting, whole canes, rather than one and two nodes "sets" are placed in the furrows, with a slight overlap. Advantages claimed for this type of planting are that the "spring" of cane is uniform (each eye germinating), "supplying" is unnecessary, and an optimum number of shoots will survive by natural selection. These advantages have been realised in the trial field in spite of an abnormally dry season. Its one disadvantage is that more planting material is required.

(c) *Planting of Bunds :*

As soon as possible after a field has been cultivated, the bunds—and the lower banks of contour drains—should be planted continuously with cane. The cane roots "hold" and stabilize the bunds. These canes are then cut and used as planting material in November.

The ability of continuously planted cane to hold together bunds has made it unnecessary to plant with a closer growing species such as *Paspalum notatum*.

THE POTASH AND HUMUS STATUS OF SOILS IN WHICH SUGAR CANE IS GROWN

Recently much thought has been given to the comparative effects of artificial and organic manures on the humus status of sugar cane soils. In Barbados, during the last twenty years, the tendency has been to use more artificial and less pen manure. Soil samples are therefore being taken for analysis from fields which were sampled, in the same manner, twenty years ago. It is hoped to correlate the manurial history of the fields with any change in organic matter content which has taken place during those years.

The fluctuation in exchangeable potash content of the same soils is also being investigated. For many years, potash applications—particularly to ratoons—were inadequate, and the present recommendations of the Department of Agriculture were made to make good that deficiency. It is felt that reserves of exchangeable potash may now have been built up to more than the limiting value for cane growth, in which case a reduced application might be sufficient to maintain the potash level.

SOIL SURVEY OF THE AGRICULTURAL STATIONS

Soil samples are being taken from each field at each of the District Agricultural Stations. In this way the effect of the crop rotation on soil fertility will be determined.

To date, analyses of samples from the following have been completed:—

Jerusalem	— Field No.2
	— Field No.4
Sayes Court	— Field No.2
	— Field No.4
Groves	— Field No.4
	— Field No.5
Haggatts	— Field No.2

Samples were taken, in each case, immediately after a cane crop had been taken off.

SOILS

MECHANICAL ANALYSIS

		MECHANICAL ANALYSIS							pH	Nitro- gen	Organ- ic C.	Exchange- able K ₂ O
		Coarse Sand	Fine Sand	Silt	Clay	Loss by solution	Moist- ure	CaCO ₃	Diff.			
HAGGATTS	..	7.83	53.60	11.33	18.71	5.40	1.60	0.00	+ 1.53	.092	.93	.0136
GROVES Field	No. 4	.53	6.11	11.03	65.83	3.13	6.15	4.46	+ 2.76	.214	2.60	.0324
"	No. 5	.58	6.25	17.63	53.38	3.73	6.83	9.37	+ 2.23	.201	2.32	.0248
SAYES COURT	No. 2	.41	4.25	20.43	44.25	4.22	10.99	13.18	+ 2.27	.095	2.39	.0152
JERUSALEM	No. 2	5.75	24.03	7.48	52.50	1.74	6.52	2.15	- 1.17	.111	1.41	.0142
"	No. 4	5.28	16.95	5.05	42.58	3.08	5.80	19.53	+ 1.73	.119	2.85	.0135

Features worthy of note are:—

- (i) the high potash content at Groves.
- (ii) the sandy nature of Haggatts soil, with low organic matter content and nutrient status.
- (iii) the low nitrogen status of all soils except Groves.

Advisory Service:

The advisory service on soil matters to plantations was continued.

Milling Laboratory:

206 bundles of cane were milled and the expressed juice and megass were analysed, the sugar and fibre content of the whole cane being determined therefrom. These analyses were made in connection with manurial and genetical trials carried out by the British West Indies Central Sugar Cane Breeding Station and by this Department.

SECTION V.

GOVERNMENT LABORATORY

By

C. A. COPPIN

Government Analyst

(i) Analytical Work

(a) FOOD AND DRUGS LABORATORY

The total number of samples examined during the year for the various Government Departments and for private individuals was 973.

The number and distribution of samples dealt with annually for the past five years is set out in Table I.

TABLE I

	1942	1943	1944	1945	1946
Police Department ..	416	412	350	343	261
Customs Departments ..	53	46	54	42	75
Public Works Department..	23	12	8	15	30
Agricultural Department ..	12	110	316	176	46
Parochial Departments ..	145	265	371	334	319
Agricultural Society ..	116	33			
Other Government Depart- ments ..	24	39	62	58	62
Private Individuals ..	153	112	76	80	40
			140	108	140
Total ..	942	1,029	1,377	1,156	973

Particulars of the various samples analysed in the Food and Drugs Laboratory for 1946 are:—

(i) Police Department

Vicera and examination for poisons ..	18
Coins and counterfeiting exhibits ..	14
Butters and cooking oils ..	38
Milks ..	108
Tea, coffee, cocoa, cornmeal, flour, starch and baking powder ..	51
Animal Feed ..	2
Rums ..	29
Miscellaneous ..	5
Total ..	261

Viscera and examination for poisons. Arsenic in the form of 'Atlas' wood preservative was found in a sample of wine and five and a half grains of white arsenic was separated from portions of the viscera and vomit of a person who was supposed to have taken some of it.

Arsenic in the form of Lead arsenate was also found in another sample of viscera and the circumstances suggested that it was taken in the form of Gator Roach Hives.

Coins and Counterfeiting exhibits: A number of exhibits comprising Plaster of Paris, bits of metal, acids etc. and tools were submitted in connection with a case of counterfeiting. The sixpenny piece submitted was counterfeit. A half-crown submitted on another occasion was also found to be counterfeit.

Butters and Cooking Oils: All of the samples submitted were genuine.

Milks: Eighteen samples of milk were found to be adulterated by means of added water.

Tea, Coffee, Cocoa, Flour etc.: All samples were genuine.

Animal Feed: The samples submitted were genuine.

Rums: Of the twenty-nine samples examined one was below statutory strength.

Miscellaneous: These include beer, paint and articles of clothing.

(ii) *Customs Department :*

Petroleum	64
Miscellaneous	11

Petroleum samples comprise kerosene and other fuel oils for Flash point determinations and aviation spirit and petrol for specific gravity determinations. A sample of lubricating oil was also received and samples of crude oil were also examined for petrol and kerosene content.

Miscellaneous samples submitted for the purpose of classification consisted of Hydrogenated Pitch and oil, Denaturants such as Wood naphtha, Salicylic acid and *Diethyl phthalate*, a number of scouring soaps and powders and a sample of tinned stewed beef.

(iii) *Public Works Department :*

Analyses were carried out on samples of water from the various sources of supply in the island. A high standard of organic purity was maintained ensuring a continuously good supply to the general public.

(iv) *Department of Agriculture:*

Samples examined were Coal gas from the supply at the Government Laboratory, Stock Feeds such as are used in the Balanced Animal Feed mixture, milks from the Government Agricultural Stations and Stock Farm, mare's urine for pregnancy tests and well waters for salinity.

(v) *Sanitary and Parochial:*

A sample of flour submitted by the Sanitary Commissioners was found to be in good condition except for a slight damage in spots by water. A sample of pickled pork was also found to be in good condition.

The free chlorine content of the E.C. Disinfectant supplied by the Commissioners of Health was periodically determined.

Three hundred and twelve samples of milk submitted by the Commissioners of Health were examined for adulteration. Fifty-seven of these were found to be adulterated.

(vi) *Agricultural Society:*

Samples of rum, sugar and fancy molasses were analysed in connection with the prize awards of the Annual Industrial Exhibition. A report on these analyses is submitted to the Agricultural Society.

(vii) *Other Government Departments:*

The samples submitted were chiefly E.C. Disinfectants as supplied to the General Hospital, and sea water from Barbados Welfare Limited.

(viii) *Private Individuals:*

The following analyses were carried out during the year:—

Sugars and molasses	..	..	..	42
Cane juice	..	..	..	47
Fertilizers	..	..	..	6
Feeding Stuffs	..	..	..	7
Rums and Falernums	..	..	..	4
Milks	..	..	..	6
Cooking oils	..	..	..	4
Waters	..	..	..	7
Hydrometers for calibration	..	..	..	6
Miscellaneous	..	..	..	10
Total				140

(b) SUGAR LABORATORY.

This laboratory was taken over from Professor d'Albuquerque in 1929 and operated by the Government as a commercial undertaking. The number of samples, expenditure and revenue are set out in the table attached. This shows that the average crop samples amount to 42,000 and the average surplus revenue to £1,221.

Experiments conducted at this laboratory have conclusively indicated that an analysis on a composite daily sample provides as accurate a result as the numerous daily samples now submitted. Further a more complete analysis showing moisture content and insoluble matter would serve a more useful purpose than the present single polarimetric test. Provision has been made and this procedure will be operated during the present crop; there will therefore be a considerable diminution of the number of samples passing through this laboratory.

(ii) *Investigational Work*

(a) *Government Factory:* During the year under review the Government Analyst as Chairman of the Government Factory Committee paid several advisory visits in connection with the processing of cassava and other vegetables at the Government Factory. With the removal of the compulsory planting of cassava a very much reduced quantity of meal was manufactured—1,503 bags were manufactured as against 26,292 the previous year. This meal is used as a Carbohydrate feed in preparing the Balanced Animal Feeding Stuffs.

(b) *Pottery:* Technical advice was also given to Messrs. Barbados Welfare Limited in connection with their various Pottery improvement schemes and in the construction of larger kilns burning natural gas and used in the firing of their various wares. Assistance and advice were also given to the Apes Hill Lime Works in connection with the construction of a larger and improved kiln capable of producing high quality lime for clarification purposes in the sugar industry.

(c) *Cotton Spinning Plant*: Some planning and assistance was also given in connection with the erection and establishment of the experimental cotton spinning plant here.

TABLE

Showing Excess of Revenue Over Expenditure for the Seventeen Year Period 1929-30 to 1945-46 For the Sugar Laboratory

Financial Year.	Number of Samples	Expenditure	Excess of Revenue over Expenditure.
1929—30 ..	38,092	£868 0 0	£1,037 0 0
1930—31 ..	30,080	798 0 0	706 0 0
1931—32 ..	27,853	715 0 0	678 0 0
1932—33 ..	34,110	761 0 0	945 0 0
1933—34 ..	47,616	797 0 0	1,584 0 0
1934—35 ..	28,163	600 0 0	808 0 0
1935—36 ..	54,742	710 0 0	2,027 0 0
1936—37 ..	48,522	784 0 0	1,642 0 0
1937—38 ..	51,866	585 0 0	1,708 0 0
1938—39 ..	54,461	916 0 0	1,807 0 0
1939—40 ..	57,052	973 0 0	1,880 0 0
1940—41 ..	45,593	943 0 0	1,332 0 0
1941—42 ..	26,520	951 0 0	376 0 0
1942—43 ..	41,271	893 0 0	1,171 0 0
1943—44 ..	48,786	917 0 0	1,522 0 0
1944—45 ..	31,855	1,179 0 0	414 0 0
1945—46 ..	53,266	1,550 0 0	1,113 0 0
Total ..	719,848	13,245 0 0	20 750 0 0
Average ...	42,344	779 0 0	£1,221 0 0

SECTION VI.

ENTOMOLOGY

By

R. W. E. TUCKER,

Entomologist.

During ten months of the calendar year ending December 31st 1946, the Entomologist acted as Director of Agriculture in place of Dr. S. J. Saint, who was absent on leave in January and February and from May onwards.

Entomological work was, however, maintained on the lines of the 1945—46 financial year report, with the addition that the Entomological Assistant and Field Assistant were assigned to inspecting and checking the acreages planted under Local Food Production (Defence) Regulations as well as conducting insect pest investigations in food crops, and assisting in checking the number of animals kept (also under Defence Regulations) for local meat supplies.

These extra duties involved a considerable amount of work, but were as equally necessary as investigating the incidence of insect pest damage and advising on pest control work, in view of the world wide shortage of food products during the year under review.

In the last full report published in 1939, it was stated that the policy of the Entomological section in the control of *Diatraea saccharalis* (the major pest of the main crop of the Island), was a combination of the use of mass reared and timed liberations of the egg parasite *Trichogramma minutum* and the introduction and propagation of any promising parasite of the larval stages of *D. saccharalis*.

In pursuance of this policy, the dry area melanic strain of *Metagonistylum minense* was introduced from Brazil in 1939, and was reared in very large numbers in the laboratory and distributed throughout the Island in that and in succeeding years. In 1943 an island wide survey was made to determine the establishment or otherwise of this larval parasite, and of the other introduced parasites of the genera *Lixophaga* and *Paratheresia*. These surveys showed that under the cultural and climatic conditions of Barbados, larval parasites could not maintain themselves in the field, and that as soon as laboratory reared releases ceased, parasitism by the above larval parasites disappeared.

The control of the major pest *D. saccharalis* rested therefore on the timed mass liberations of the egg parasite *T. minutum*.

The effectiveness of these releases, running into between two and three hundred million parasites per 'liberating season' had been proved, and despite the difficulties of war conditions, the output was maintained; and despite tyre and petrol shortages, the planters came in regularly for the parasites and there was no difficulty in disposing of each year's output. It has been stated before, however, that the field distribution is entirely in the hands of the planters and the Department has no control over the efficiency of this distribution.

Nevertheless, this method of control over the damage caused by *D. saccharalis* has proved so successful for the conditions and climate of Barbados,

that the cane joint or internode infestation was reduced in the crop reaped in 1946 to the lowest figure on record, namely, an average figure of 9.5 per cent. despite the fact that 74.5 per cent. of the cane planted in Barbados was the variety B.37161. which is not only recognised by planters as being highly susceptible to moth borer attack but which shows the highest average infestation in all cane varietal counts.

The next most serious pests of sugar cane in Barbados are the root borer, *Diaprepes abbreviatus*, and the brown hard back, *Clemora smithi*, but the position regarding these pests is somewhat obscure. Previous reports and articles (1) on these pests show that for a period of some years plantations co-operated splendidly in hand collecting and other measures against these pests, and literally tens of millions of adult beetles were reported collected and destroyed which, in this small Island, produced visible results. With the advent of war and other troubles, however, collections ceased and there are no means of measuring the present incidence of these pests other than by digging around cane stools in the field, or by judging the effect on the vegetative growth of cane. It is possible that the concerted drive against these pests had its effect before circumstances halted it, and that the pest population has not recovered; or that it is slowly building up again and may prove a source of further loss to cane growers.

Other insect pests and experimental work are reported under their respective headings below.

Small Moth Borer (*Diatraea saccharalis*)

During the calendar year under review, the record number of 491,869,000 of the egg parasite *Trichogramma minutum* was bred, of which 430,386,000 were available to, and were distributed to planters and peasants.

This large increase in parasites bred was due to several changes; the first was the complete change over from maize to wheat for rearing *Sitotroga cerealella* on the eggs of which *T. minutum* is mass reared for field liberations. The change was made first as an experiment and tested for two or three years, both experimentally for record purposes and in the breeding units in which the proportions of wheat were gradually increased. Final complete change over was made because wheat was easier to obtain and, in addition, it was cheaper. This change over entirely to wheat very greatly increased the number of *Sitotroga* eggs available in which to breed *Trichogramma*.

Another change introduced was more regular spraying with water of the moth breeding units in order to keep both temperature and humidity at an optimum level; this was also proved to increase production.

The most recent experiment, introduced by the Officer in charge of the units and parasite breeding building, was to sieve or screen all grain as it was received and before it entered the units for fumigation etc. It had been found that even long periods of exposure to maximum concentration of HCN gas failed to eliminate insect pests and parasites which, at times, seriously reduced *Sitotroga* production. The sieving operations proved very successful indeed. The units, after fumigation, were and remained practically free from deleterious pests and parasites, whereas the residues obtained from the sieving produced large numbers of both, which, had they gone into the units with the grain, would not, from past experience, have been entirely removed by fumigation but would have bred up and caused the yearly losses previously experienced.

Finally, it had been found by experiments in previous years that quicker,

more regular and heavier crops of *Sitotroga* could be obtained by infesting the units when they were ready for production, with pure cultures of *Sitotroga* eggs instead of liberating *Sitotroga* moths themselves.

Consequently in 1946, *Sitotroga* moths were never used in any of the units, instead they were bred elsewhere, their eggs collected and examined, and pure cultures of *Sitotroga* eggs only were used to start up the units.

The combined results of these measures, all of which were put into full practice for the first time throughout all units in 1946, resulted in a far greater production of *Sitotroga* moths and therefore a record production of the egg parasite *Trichogramma minutum* for timed liberations in the canefields.

The result for the crop reaped in 1946, when 346,009,700 parasites had been liberated in 1945, was that the average cane joint infestation was reduced to 9.5 per cent. This figure is just under one third of the infestation which was prevalent before the above control measures were put into practice, and has been achieved despite the fact that each heavier yielding variety of cane has proved both in the field and in detailed plot experiments to be more susceptible to *D. saccharalis* infestation than former varieties which have disappeared from cultivation and no longer figure in field records.

The above figure of 9.5 per cent. cane joint infestation is stated to be the average figure for the Island. The lowest figure recorded in 1946 was 4.9 per cent. infestation for the variety B.34104, and the highest was 12.0 per cent. infestation for the variety B.35187. The figure for the variety B.37161 which occupied 74.5 per cent. of the acreage planted in cane was 11.5 per cent., whilst a new and promising variety of which a few factory samples were obtained in 1946 showed 8.5 per cent of its joints bored by *D. saccharalis*.

The effect of the record distribution of 430,385,000 *T. minutum* in 1946 has resulted in an average internode infestation in 1947 of 12.8 per cent. This figure is higher than the record low figure of 9.5 per cent. obtained in the previous year, but whereas in that year seven varieties of cane were examined in the random samples taken at factories, only one variety was obtained in 1947 by the same method of random sampling. That variety was B.37161; hence to obtain a comparable figure for 1946, the infestation of B.37161 only in both years should be considered. As stated above, the infestation figure for B.37161 in 1946 was 11.5 per cent. In view of the climatic conditions in 1946-47 which were adverse both to parasite survival in the field, and to cane growth, both of which factors invariably produce a high figure for percentage of cane joints bored, the increase from 11.5 per cent. to only 12.8 per cent in cane joint infestation in the variety B.37161 is due to the increased parasite liberations in 1946 and can be considered as further proof of the efficiency of mass liberations of *T. minutum* in preventing any catastrophic rise in total loss of cane as measured by the standard of cane joint infestations.

The word catastrophic is used advisedly, because if the mortality rate in *D. saccharalis* eggs is not kept down to an annual low level by mass parasite liberations, it is quite possible for climatic complexes to cause a reduction, as stated before, in the efficacy of *T. minutum* to enable the much hardier *D. saccharalis* to increase rapidly and to cause most serious damage and financial loss.

Cane Varieties and (*D. saccharalis*)

Work on the relation between borer damage and cane varieties was continued as in previous years, but as only one set of comparative figures can be obtained each year, and as new potentially commercial varieties continue to ap-

pear due to the excellent work of the Central Cane Breeding Station in Barbados, it will be some time yet before definite conclusions can be drawn. In the mean time, as it has been established in other countries as well as in Barbados that moth borer damage is definitely connected with cane variety, and that new varieties can be significantly and continuously more heavily bored, i.e. more susceptible, than varieties which they replace, it is possible that eventually a variety resistant to moth borer will appear and that this quality of resistance can be utilised.

Root Borer of Sugar Cane (*Diaprepes abbreviatus*) and Brown Hardback (*Clemora smithi*)

Owing to the cessation for various economic reasons of island wide hand collection of these serious pests of roots of sugar cane, it is not possible to say whether the years of organised and successful destruction of adult beetles has resulted in a permanent reduction to a level below serious economic damage of these pests. The low and irregularly distributed rainfall during most of 1946 caused many ratoon fields to show signs of growth failure which, being somewhat greater than the lack of moisture warranted, may possibly point to a recrudescence of the above cane root pests.

The predator, *Pyrophorus luminosus*, imported twelve years ago from Puerto Rico to assist in the control of *Clemora smithi* can still be found both in the larval and adult stage in the region of the original main liberations; but it is not widespread and cannot be considered to have anything but a local effect on the prevalence of brown hardbacks.

The establishment by plantations of artificial ponds, stocked with 'millions' in order to foster the breeding of the giant toad, *Bufo marinus*, which is known to be an effective predator of *Clemora smithi* (brown hardback), has made no progress. On the contrary, the drying up of ponds continues and the maintenance of natural breeding places for *B. marinus* regresses.

Sugar Cane Stem Borer (*Metamasius sericeus*)

The weevil, which can cause extensive damage to cane stalks, appeared at one time to be on the increase especially in the higher, wetter areas of the Island. Its attacks were most severe in the variety B.35187; as this variety is now being replaced in the Island's cultivation by newer varieties which are not so severely attacked, the incidence of this pest appears to be on the decrease.

The only practical control over it which is at present known is field sanitation, which did not in many cases improve during the war.

During the year under review, one instance was recorded of this weevil attacking banana plants and causing noticeable injury.

Scarabée of Sweet Potato (*Euscepes postfasciatus*)

Seven years of experimental plot work and field experiments (2) have shown that this pest can be controlled by three properly timed and properly applied sprayings with lead arsenate. The same spray programme also controls sweet potato thrips, (*Dendrothripoides ipomaea*), and the army worm, (*Xylomyges eridania*); it also reduces infestation by the leaf hopper (*Empoasca fabalis*), which appears to be increasing greatly in incidence, and which causes 'burning' and distortion and dwarfing of sweet potato foliage and some loss in yield.

Unfortunately, adequate spraying apparatus was not obtainable during the war and high cost of labour and the difficulty of maintaining the apparatus in good order, has prevented spraying from being taken up as a routine operation.

Cotton Pests

The same considerations prevent adequate control of the cotton leaf defoliator *Aletia argillacea*, and losses from this pest still occur. Pink boll worm, *Platyedra gossypiella* was not found in 1946, making the seventh year in which this pest has not been found in Barbados. As a result, the cotton close season has been reduced to three months and the planting season has been advanced to July 1st, in order to encourage a revival in the planting of cotton.

Stored Grain Pest Control

Experiments with inert dusts have been carried out and satisfactory results obtained.

Insect Pests of Maize (*Heliothis obsoleta*) and (*Laphygma frugiperda*)

Experiments with lead arsenate spray, D. D. T. dusts and oiling of 'silks' have been carried out.

Experiments with D.D.T. and Gammexane

Extensive experiments have been carried out, especially with D. D. T., as a measure for controlling houseflies at the District Agricultural Stations. Excellent results were obtained, by spraying walls and ceilings of animal pens, and of rooms of dwelling houses with 5 per cent. D. D. T. in kerosene at the rate of one gallon per thousand square feet, and this spray is now a standard protection against cockroaches and houseflies, and against other pests such as fleas, centipedes, bed bugs, ticks, ants etc. Experiments also proved that a concentrated solution of D. D. T. in kerosene can be incorporated in home made water colour washes which are extensively used in the tropics inside and outside of houses.

A Departmental Pamphlet has been published giving details of use, warnings against misuse and limitations of use of D. D. T., and also describing the preparation and use of a home made kerosene soap and D.D.T. emulsion.

Less experience has been obtained with Gammexane though some agricultural trials have been carried out. It is expected that further work will be carried out in soil treatments or, if the product is deodorised, in houses.

Cottony Cushion Scale (*Icerya purchasi*)

This pest has been controlled by the introduction, through the Imperial Institute of Entomology Laboratory, at Belleville in Canada, of the well known predator *Rodolia cardinalis*. Occasionally, the pest gets ahead of the predator and appears here and there, but so far the predator has always succeeded in overtaking it.

Coconut Scale (*Aspidiotus destructor*)

Coconuts are grown in Barbados mainly for drinking purposes and are sold in the green, unhusked condition. There is no copra industry as is known in the other countries, and the planting of coconuts in Barbados is mainly on the leeward sea coast, with scattered palms or small groups, avenues or plantings of palms throughout Bridgetown and the countryside to the Windward coast.

Wherever failure to produce crops of nuts occurs or where excessive yellowing of leaves or fronds is found, the cause has heretofore been considered due to physiological or soil troubles. In very rare cases do palms which have survived the young growth stages die completely except, as stated, from physiological causes or from age.

Nevertheless, all coconut palms show varying degrees of yellowing and, in some cases, dying of the lower fronds, though growing centres remain green and vigorous and, in cases examined so far, varying degrees of white fly and scale insect infestations are found.

In a very large proportion of cases the primary infestation is by white fly, *Aleurodicus cocois* (Curt), with scattered but usually minor infestation by the elongate black scale, *Ischnaspis longirostris* (Curt), and occasional infestations by an unidentified round, purplish black scale. In some cases there are considerable infestations by the scale, *Aspidiotus destructor*, and as this scale is capable of causing great damage, or even death to infested trees, casual observers invariably ascribe the yellowing, or in rare cases premature death, of lower fronds of coconut trees entirely to *A. destructor*.

Supplies of the predator *Cryptognathus nodiceps* were frequently promised from Trinidad, where *C. nodiceps* is understood to be a major factor in the control of *A. destructor*, which is a serious pest there.

Such an introduction was welcomed, though it was known that there were two local predators of *A. destructor*, namely, *Scymnus* sp. and a species of the green lace wing fly, *Chrysopidae*, together with mites and Psocids of which the correct role of predator or scavenger had not been investigated.

The known facts were therefore that yellowing of lower leaves of coconut palms was prevalent, but that death or non-fruiting of palms, when it occurred was due mainly to soil or physiological reasons and that though *Aspidiotus destructor* was undoubtedly present it was not the only scale to cause yellowing of fronds and had, in addition, two local predators which were found to exert reasonable control over local infestations of *A. destructor*.

There was no reason, however to refuse advice to introduce the predator *Cryptognathus nodiceps* from Trinidad.

This introduction was made in February, 1947, but as the predators arrived without adequate notification, the first consignment of around thirty survivors were liberated at once at areas in the thin fringe of coconut trees on the leeward coast.

Arrangements were also made at once to build a breeding cage large enough to accommodate a small coconut palm in a small half barrel, and to pot young dwarf coconut palms for infestation in order to maintain a supply of *A. destructor* for breeding work, and a search was made for young coconut palms already infested and small enough to be dug up and put in half barrels for cage breeding work.

In the meantime each small weekly consignment of *C. nodiceps* from Trinidad was liberated as soon as received by air mail and a few, especially if mating couples were observed, were kept back for laboratory rearing and observation. One small consignment of fourteen which contained three mating couples was liberated on the windward coast where, though a small amount of scale was found, the major infestation of all young coconut palms was by white fly.

The weekly consignments of *C. nodiceps* from Trinidad started on 11th February, 1947, but as there was no prior notice of their arrival it was some weeks before potted infested coconut palms and a suitable breeding cage were available.

Altogether one hundred and thirty-four *C. nodiceps* were received by air from Trinidad between February 11th and April 10th and, as stated, the ma-

jority were liberated as soon as received. A few were kept back for laboratory rearing. Tube rearing was not successful, but cage rearing showed some promise, and on April 27-28 twelve laboratory reared *C. nodiceps* hatched out.

By this time, the consignments from Trinidad had ceased temporarily and as it was difficult to obtain adequate supplies of the right stages of *Aspidiotus destructor* in the field, the twelve locally reared predators were liberated and a fresh start is contemplated when supplies from Trinidad are resumed and when potted palms have attained sufficient growth and infestation to supply relays of food for the caged predators.

In the meantime a watch will be kept along the leeward coast for any progeny resulting from the liberation of *C. nodiceps* made so far.

Wood Ant Control

During the year the Wood Ant Inspector carried out inspections and treatments in fifteen Government buildings and seventeen private buildings, including churches. In addition, there were some routine re-inspections, and in all cases a typewritten report of damage found and recommendations for future treatment is given. In the case of private houses, the Government charges a fee of £2. 0. 0. for these inspections, though in cases where inspections are of a preliminary nature, with no written report, no fee is charged.

Inspections for damage by wood ants in cane fields were possible at seven plantations only during 1946 owing to the demand for other inspections.

An account of the Termites of Barbados was published in the *Agricultural Journal*, Department of Science and Agriculture, Vol. 8. No. 4.

During the year the Wood Ant Inspector and the Field Assistant in charge of parasite breeding work assisted in the examination of three hundred and forty-one cases of tea from India, and in three shipments of cotton seed meal from Haiti in order to guard against the introduction of insect pests.

Fumigation

During the year, two thousand nine hundred and sixty-four empty copra bags were fumigated with HCN gas for the Barbados Cotton Factory.

Economic Zoology

Assistance in the control of rats in cane fields and in warehouses was also given by the Entomological section; the bait now being used and found very successful is the standard Zinc Phosphide bait, the mass manufacture and distribution of which is carried out by the Agricultural Society of Barbados.

The Entomological section also took the lead in purchasing early in 1946 a quantity of Metaldehyde (6,000 bars) which has been distributed free, with instructions for use, as a slug poison. As an example of its effectiveness, one plantation which used the bait to control slugs which were ruining newly planted sweet potato fields reported the collection of sixteen and a half gallons of dead slugs after one application of the bait. The obtaining of this metaldehyde was fortunately very timely as damage by slugs assumed considerably increased proportions during 1946, both on plantations and in peasant holdings and private vegetable gardens. More of the poison has been ordered.

Buildings

Four of the moth breeding buildings used in *D. saccharalis* control were moved bodily by the Public Works Department to new sites in alignment with the other units and the parasite breeding building, thus making a neater and more orderly arrangement.

References

1. *Journal, Department of Science and Agriculture, Barbados*, Vol. 8, No. 1.
2. *Journal, Department of Science and Agriculture, Barbados*, Vol. 6, No. 4.

SECTION VII.

PLANT DISEASES AND COTTON

By

D. R. D. WILES

Plant Diseases Inspector.

Mosaic Disease of Sugar Cane

There were no infected areas proclaimed during the year and the areas which had been previously proclaimed and supplied with healthy cane plants remained free of infection. It is hoped that the peasants in these areas, viz., Hillaby and Shop Hill, St. Thomas and Rock Hall, St. Andrew, will continue to select and plant healthy plants thereby preventing a recurrence of the disease.

Cotton

The Cotton and Okra Close Seasons were proclaimed to extend from 1st April, 1946 to 30th June, 1946 and planting of the new crop took place this year in July instead of September. It was hoped that this earlier planting season would have been taken advantage of by cotton planters who had been clamouring for earlier planting, but seed was only distributed to plant 153 acres made up as follows:— Plantations, 28, Peasants, 125.

The actual area reaped was 125 acres which gave a yield of 52,690 lb. seed cotton and yielded 13,819 lb. of lint made up as under:—

		<i>Plantations.</i>	<i>Peasants.</i>
Yield percentage	..	26.03%	26.27%
Lint yield	.. ..	2,556 lb.	11,263 lb.
Seed cotton	.. ' ..	9,818 lb.	42,872 lb.

Cotton Selection

During the year the Cotton selection work was placed under my supervision and from previous years' selection the following varieties were selected to carry on the work:—B.4204, B.4212, B.4301, B.4404, B.4411, B.4413 with B.1 as Standard. These were planted at Codrington in two variety trials and reaping commenced in Mid-December and lasted to the end of March. The yields proved to be good and the majority of the varieties yielded over 300 lb. of lint per acre and it has been decided to repeat the experiment next crop season.

Selection of seed for the Progeny Row Selections will be made from the abovementioned varieties. No selection was made from the 1945—46 plots as it was found that crossing had taken place in the previous crop and the whole experiment had to be discarded.

Samples of lint of the Island crop were sent to the Shirley Institute for a small spinning test and the report received on them states that "the quality is being satisfactorily maintained".

Cotton Pests and Diseases

There was a slight attack of the defoliating worm, *Aletia argillacea*, but this was kept under control by spraying with Lead arsenate. No Pink Boll-

worm has been observed in the growing crop or at the Ginnery during the year and it is hoped that the Island will remain free of this pest as it has not been observed since January 1939. Slight attacks of Angular Leaf Spot were observed during the growing season but did not appear to have hindered the yield in any way.

Routine inspection of articles suspected to contain Cotton from other West Indian Islands was also carried out.

Plant Pest and Disease (Importation) Act

Seven (7) permits to import planting material (Class C) were issued under this Act.

Plant Export Certificates

Fifty-eight (58) plant export certificates were issued during the year.

Miscellaneous Inspections of Imported Planting Material.

199	packages of Bulbs, Rose Trees,	Examined & Passed
	Vegetable & Flower Garden seed.	" "
9	packages of Orchid plants	" "
8	Orchid Plants	" "
19	Citrus Plants	" "
328	packages of Mulberry Cuttings	" "
3	packages of Rose Trees	" "
111	Coconut Plants	" "
14	bags Coconut Plants	" "
1	package Strawberry Plants	" "
1	package Bougainvillea Plants	" "
10	Ixora Plants	" "
40	bundles Xmas Trees	" "
2	packages Seed	" "
1	package Gerbera Plants	" "
2	packages Mango Plants	" "
1	package Gardenia Plants	" "
1	package Lily Plants	" "
4	Cocoa Pods	" "
1	Plant	" "
7	bales Stained Cotton Lint	" "
1	Cactus Plant	Roots Washed
4	packages Plants	" "
3	Coconut Plants	Destroyed
1	Plant	" "

SECTION VIII

ANIMAL HUSBANDRY

By

A. G. MILL,

Livestock Officer.

The six local Agricultural Stations established under Colonial Development and Welfare Scheme for Agricultural Development at "The Home", St. Philip, "Sayes Court", Christ Church, "Groves", St. George, "Haggatts", St. Andrew, "Jerusalem", St. Peter, and "Bullen", Holder's Hill, St. James, continued to serve as stud centres and it is gratifying to note that as such they are being used more and more.

The following table shows the record of services at the stations (including the Central Livestock Station during the financial year 1st April, 1946—31st March, 1947, along with the census figures of the island's population for the same types of livestock:—

<i>Services.</i>				<i>Population.</i>	
<i>(1/4/46—31/3/47)</i>				<i>(Census Figures)</i>	
Cattle	..	..	..	1,163	5,955 (dairy cows 2 years and over)
Goats	..	..	..	1,118	16,099 (includes bucks and kids)
Sheep	..	..	..	775	33,444 (includes rams and lambs)
Pigs	..	..	..	573	9,971 (sows and gilts)

The service fees charged are as follows:—

					\$	c.
Bulls (Imported)	..	..	..	..	5.00	
Bulls (Grade)	..	..	..	..	.72	
Boars (Imported)	..	..	..	..	1.44	
Boars (Locally bred)	..	..	..	..	.48	
Buck Kids (Imported)	..	..	..	..	1.20	
Buck Kids (Born to imported Does)	..	..	..	..	.60	
Buck Kids (Grade)	..	..	..	..	.18	
Rams	..	..	..	..	.18	
Stallion	..	..	..	..	12.00	—\$12.00 per live foal thoroughbred— 50c. groom's fee.
Stallion	..	..	..	..	12.00	—Half-bred mares—50c. groom's fee.

Much progress was made during the year with the buildings at the Central Livestock Station which is being established on Government lands at the Pine Plantation, St. Michael, and the buildings were practically completed by the end of the Colony's financial year. The chief aims of the station are to improve the island's livestock by the introduction of higher quality breeds and to de-

monstrate the value of a dairy herd as an ancillary to sugar cane agriculture. Accommodation is being provided for a herd of sixty (60) dairy cows (including dry), for pigs, goats and poultry. Eighty (80) heifers of varying ages will be raised to serve as milch cow replacements on the station and for release to local cattle owners. Young bulls will also be reared for these purposes. The heifers will be herded in shade paddocks. Horses will be bred chiefly for sale to plantations.

Fodder crops are being planted on lands attached to the station with a view to making the station as self supporting as it is possible for it to be under local conditions.

Livestock already imported under the Agricultural Development Scheme, are as follows:—

One	(1)	Thoroughbred Stallion.
One	(1)	Pedigree British Friesian Bull.
One	(1)	Pedigree Guernsey Bull.
One	(1)	Pedigree Jersey Bull.
Two	(2)	Pedigree Berkshire Boars.
One	(1)	Pedigree Essex Boar.
Two	(2)	Pedigree British Alpine Goatlings.
Two	(2)	Pedigree British Saanen Goatlings.
One	(1)	Pedigree Saanen Goatling.
Three	(3)	Pedigree British Alpine Males.
Two	(2)	Pedigree British Saanen Males.
One	(1)	Pedigree Saanen Male.

In addition to these is the pedigree Canadian Holstein bull presented to the Government by Mr. and Mrs. G. Greene of Toronto, Canada.

All the imported stud animals are more or less acclimatized and those that are of age are on service at the various stations. The doe goats arrived in kid to bucks other than the six imported. They have all kidded and their male progeny is at stud.

As far as the imported bulls are concerned, they are being used, so as to safeguard them as far as possible from disease, on government and on tested stock only. Wherever there is a danger of a "dirty" contact artificial insemination is employed.

Later it is hoped to explore the possibility of sale of semen from imported animals to the neighbouring islands.

At the end of December the complement of livestock acquired at the various stations is as follows:—

Ewes	..	..	..	..	..	3
Bulls	..	..	..	..	..	16
Buck Goats	..	..	..	..	..	14
Rams	..	..	..	..	..	9
Boars	..	..	..	..	..	13
Cows	..	..	..	..	..	37
Heifers	..	..	..	..	..	27
Bull Calves	..	..	..	..	..	5
Heifer Calves	..	..	..	..	..	3
Milch Goats	..	..	..	..	..	7
Carried Forward	..	..	..	..	..	134

	Brought Forward	..	..	..	134
Goatlings	..	..	..	..	3
Bucklings	..	..	..	..	3
Lambs	..	..	..	..	1
Sows	..	..	..	..	25
Gilts	..	..	..	..	12
Store Pigs	..	..	..	..	55
Horses	..	..	..	..	8
Mules	..	..	..	..	6
Donkeys	..	..	..	..	2
Total					249

Consideration is now being given to the importation of poultry to serve as foundation stock at the Central Livestock Station.

An offer has been made by the Barbados Poultry Association to supply the very best of their laying tested poultry, free to the station, for mating to imported males for the production of foundation flocks. This offer has been accepted.

Periodical visits are being made to existing dairies and records of the milk production of dairy cattle are checked wherever such dairy is a member of the Milk Recording Society. Every effort is being made to encourage scientific breeding of all types of livestock.

Several good quality stud animals of the African Hair sheep variety have been exported to neighbouring islands with a view to introducing this variety which is admirably suited to tropical conditions.

Quotations have been received on plants which might be suitable for use with the proposed Central Milk Pasteurisation Unit. This matter is receiving consideration.

SECTION IX.

FISHERIES

By

D. W. WILES,
Fishery Officer.

Between April and June 20th, the Fishery Officer was out of the Island on Study Leave in the United Kingdom where he underwent a course in fishery matters. Before returning to Barbados, the Fishery Officer proceeded to Jamaica on an invitation from that Government, where a survey of the fishing industry was carried out and recommendations submitted to the Government of Jamaica as to the best means of helping the fishermen of that Colony with the proposed available financial assistance.

During the absence of the Fishery Officer, Mr. O. E. Moseley, Clerical Assistant to the Fishery Officer, was appointed to act as Fishery Officer.

Five meetings of the Fishery Advisory Committee were held during the year, at which the following matters were considered and dealt with :—

- (a) Financial Statements
- (b) Loans to Fishermen
- (c) Hurricane Emergency Measures
- (d) Bridgetown Fish Market
- (e) Collision of fishing boat with tanker
- (f) Export of raw turtle-shell
- (g) Fishery Experimental Station
- (h) Fishing Industry Control Act and Regulations under the Act.

Financial Statements were circulated to members of the Fishery Advisory Committee monthly to enable them to follow the state of the various accounts of Resolutions from which funds were used to finance the Loan Scheme to fishermen and boat owners. These accounts have now been set out to show at a glance the expenditure and repayments of the first four votes from which no further expenditure is anticipated in connection with loans to fishermen. The current Resolution from which loans are now being made forms the subject of a separate statement.

During the period under review, one hundred and nine loans were presented by the Fishery Officer for the consideration of the Committee, and an amount totalling \$12,868.85 was sanctioned during the period for assisting with building new boats and repairing and refitting others.

Expenditure on Loans

Expenditure on Loans for the year amounted to \$10,186.09. This brings the total amount expended over all loans to \$38,734.67.

Repayments

Repayments for this period amounted to \$8,013.93, which brings the total repayments over all loans to \$19,174.69.

Interest

Interest collected to date amounts to \$120.81.

Inspections were carried out in connection with all applications for loans and many subsequent examinations were also made to see that the work was being done along proper lines.

Eight sets of hauling-in gear were placed at strategic points around the coast to be used in cases of emergency, which occur especially during the hurricane season. These sets of gear have already been used in saving three boats which would otherwise have been lost. These boats collectively were valued at approximately £350.

The Committee made representations to the Government on behalf of the owner of the fishing boat "Mamie" which was struck and sunk while on the drift by a Norwegian tanker. This matter is still under review. As the result of this accident, one fisherman was drowned.

With a view to obtaining better prices than were obtainable locally, samples of turtle shell were taken to the United Kingdom and plans for the marketing of this shell were finally submitted to the Fishery Committee. The Government were approached with a view of financing an advance to be made to the fishermen. This was agreed upon and a scheme was worked out whereby the shell was selected and graded by this Department. A first shipment of forty-nine pounds, valued at £49, has been despatched to England and the buyers have written expressing satisfaction. A further order has already been placed for three hundred pounds of shell.

In the light of recent developments regarding the marketing of turtle shell, it has been decided to market shell in future through Messrs. Barbados Welfare Limited. The shell will be selected and graded by the Fishery Officer and, as reasonable quantities are collected, shipments will be despatched to the United Kingdom.

The new Bridgetown Fish Market, which is financed under the Colonial Development and Welfare Act, was opened officially for public use on 1st October, 1946. Many matters concerning the planning and finalising of arrangements in connection with the opening of this Market received the attention of the Fishery Division. Valuable statistics can now be collected through the system established for weighing in and tabulating all fish sold through the Market. Since this system was put into operation, 98,150 pounds of fish has been weighed in and marketed during official hours up to 31st March. It is estimated that a further 20,000 pounds have passed through the Market after the official hour of 6.00 p.m. It has been suggested that this hour should be extended to 8.00 p.m. as was originally drawn up in the scheme when planned and submitted by the Fishery Advisory Committee. The number of boats using the Market was perceptibly few, the highest average during any one month being only 12.109 boats per evening. It is considered that these statistics would be very much improved when boats were compelled by some means to make more use of this modern Market.

A number of large catches of both flying fish and dolphin have been recorded at many of the country fishing villages.

Plans for establishing a Fishery Experimental Station were submitted for the consideration of the Fishery Advisory Committee. The Committee accepted the idea and recommendations have been forwarded to the Government advising the establishment of such a station within the metropolitan area as soon as practicable.

The Fisheries Comprehensive Scheme as first planned and now included in the draft of the Island's ten year plan, has been re-arranged to make provision to establish and finance this station from funds set out under this plan for fishery development. This re-arrangement has been set out under the Fishery Officer's programme report recently submitted to the Fishery Committee.

The Fishing Industry Control Act was finally passed by the Legislature during January, 1947. This Act will now allow regulations to be submitted from time to time to the Governor-in-Executive Committee and, if approved, be put into force. These regulations, however, have to be finally passed by the Legislature. The first group of regulations have been submitted and are receiving consideration. Embodied in these regulations are schemes for the registration of the entire fishing fleet and the better marketing of fish in the Bridgetown area.

A grant of £3,000 was made available by Resolution No. 43 of 1946, for the rehabilitation and extension of the fishing industry. This grant augments those already being administered by the Fishery Committee in respect of loans for fishermen and boat owners.

Thirty-six new boats were built during the period under review, thirty-one of which received assistance by means of loans from Government through the Committee.

Five fishing boats were lost at sea and two others drifted from their moorings during the year. As a result of these accidents two fishermen lost their lives.

Inspections were carried out on the Sea Urchin at several points around the Island during the latter part of July and again in August to ascertain whether the season could be declared officially opened before the 1st September. As a result of these examinations, it was strongly advised that the season remain closed until the 1st September and, further, that greater efforts be made to prevent poaching before that time. Although it is a well known fact that some poaching did take place, especially in the St. Philip area, the season when officially opened on 1st September resulted in the best catches that have been taken in the last three years.

The fishermen are being told more of this industry and its potential values to them are more and more brought to their notice, and it is encouraging to find that greater interest is being exhibited among the men in caring this branch of the fishing industry. More transplanting work should be carried out from abundant areas to re-stock barren ones. Some work along these lines was recommended and carried out by the fishermen themselves in 1945, and it is heartening to observe the very lucrative results obtained during the 1946 season.

The capture of fish by fish pots was greatly handicapped during 1946 due to the grave shortage encountered through lack of mesh wire. Some shipments of mesh wire did arrive and control was carried out by this Department to enable the fishermen to receive their requirements.

No work on channels was possible during 1946 on account of no electrical detonators being available. The detonators arrived during late October 1946, at which time it is inconvenient to carry out this work due to rough seas. It is encouraging to note, however, that no accident has been reported from Conset and Meggs channels during the year 1946. Improvements to these channels were carried out during 1944 and although more work might have been

done at both of these channels remarkable improvements have been recorded in the last two fishing seasons.

The Tent Bay channel at Bathsheba, which was widened in 1945, was also easier to navigate during the 1946 fishing season and much fewer accidents have been recorded than previously. Conditions at Bathsheba are likely to remain difficult during the early part of the fishing season; much of this is due to the high winds that prevail at this time of the year.

During the month of November, Mr. Percy Wardrope, recently appointed Junior Fishery Officer of St. Lucia, visited Barbados for one month to receive first hand information on fishery matters and to discuss ways and means of improving the fishing industry of St. Lucia. Mr. Wardrope was shown the entire system of dealing with the fishermen, the approach for carrying out loans, the method and investigation necessary prior to the carrying out of a new loan, and many other phases of fishery administrations. Before returning Mr. Wardrope expressed the feeling that he had benefited greatly from his visit and hoped to return to Barbados when modern gear and, possibly, the Fishery Experimental Station has been established.

SECTION X.

CO-OPERATION

By

J. M. CAVE,
Co-operative Officer.

Peasant Survey

The data collected from 3,800 peasants having holdings of over one acre and under ten acres was analysed during the year. Information on locality, size, distribution, ownership, occupations, irrigation facilities and livestock kept has been obtained. Further data from the population and agricultural Census taken in April and information obtained by random samples of peasants' holdings taken by the Deputy Director and the Peasant Agricultural Instructors can now be added to this survey, and a comprehensive report on peasant agriculture will be forthcoming.

Vegetable Gardens

The Co-operative Officer assisted the Deputy Director and Plant Diseases Inspector in the three routine inspections of vegetable gardens of schools and peasants on which the annual prize competitions are based. On the first inspection of school gardens in March, careful and detailed notes were made for the information of this Department as well as for the Department of Education.

Co-operation

Several groups with varying degrees of co-operation have come into being during the year and these have received the attention, advice and assistance of the Co-operative Officer. The more important of these groups have been the St. Silas Men's Co-operative, whose main activity is raising livestock, the Ex-Servicemen's Co-operative Association and the Community Savings and Credit Association. Other groups have co-operated in purchasing stock feed, artificial manures and metaldehyde for the control of slugs.

Two articles on co-operation were submitted and published in the Barbados Welfare Limited's magazine "Community". Ten district meetings were addressed during the year on the subject of co-operation and its benefit to the peasants.

The Co-operative Officer had discussions with Miss Ibberson, Social Welfare Adviser to the Comptroller for Development and Welfare, Mr. Hotchkiss, Organiser of 4H Clubs in the West Indies, Mr. T. D. M. Girvan, Co-operative Manager of Jamaica Welfare Limited, Mr. H. Simmons, Co-operative Officer, St. Lucia, and many others. These discussions dealt with many aspects of co-operation and its place in the social, economic and agricultural development in Barbados.

Hurricane Relief

During the months of May and June, the Co-operative Officer arranged for the reservation of emergency food supplies, and organised a plan for their transport and distribution to the country parishes in the event of a hurricane striking the Island. Fortunately, no hurricane occurred and in November the supplies were released.

Other Activities

During the year, the Co-operative Officer assisted the Census Office in the preparation of questionnaires to be used for small holders and estates, carried out inspections of food crops planted on estates in St. Michael, St. George and St. James, under the Local Food Production (Defence) Control Order, 1942, No. 2, made a study of the marketing of agricultural produce in Bridgetown, and assisted the "Food for Family Fitness" Campaign being organised by Barbados Welfare Limited.

SECTION XI.

EXPERIMENTAL COTTON SPINNING PLANT

By

H. N. POMFRET,

Cotton Spinner.

During the last quarter of 1943 a small secondhand spinning plant was purchased in the United Kingdom by the Comptroller for Development and Welfare and shipped to Barbados. The scheme was prepared in order to determine the possibility of cotton spinning in the West Indies. Barbados was chosen to make the first trials, because it was thought a secondary industry would help in a small way to off-set the overpopulation problem and find work for the increasing number of town or city dwellers.

The objects of the plant when in operation, would it was thought, be threefold.

- (i) The production of string for use in the shops of Bridgetown and other West Indian centres.
- (ii) The production of 'cotton line' for the making of certain types of fishing nets.
- (iii) Developing a cottage industry for leisure hours, based upon hand loom weaving.

An understanding was also obtained from the Kings on Knitting Works (Jamaica) to take all the yarns produced which were suitable both in price and quality. The Comptroller also leased (at a peppercorn rental) an area of land from the Barbados Co-operative Cotton Factory, on which to erect a building to house the machinery; and secured an option to purchase at an agreed valuation should the experimental period indicate that successful establishment of cotton spinning was possible.

A 'cotton operator' in the person of Mr. H. B. Warrington arrived in the colony on May 24th, 1945 to operate the plant and to train local workers in the art of cotton spinning. Unfortunately, when Mr. Warrington arrived the machinery was not erected; although a local firm of engineers were very courageously attempting to install the complicated machines without plans or blue-prints. Therefore most of his time was spent advising and helping to erect the machines. The absence of qualified textile fitters resulted in a trial and error method of installation, causing a large number of breakages of vital machine parts. Some of these parts were repaired in the colony. But the most essential part of the whole plant 'The Card Clothing' was damaged beyond repair. This most essential element of the 'Carding Engine' was spoilt by a gallant attempt to put it into position without the necessary machine which has been specially designed to do the job. The 'Card Mounting Machine' as it is called did not arrive in Barbados at the same time as the rest of the machinery. A fatal omission, which has caused much trouble in addition to a great deal of wasted time and money. The experimental cotton spinning plant was taken over by the Government of Barbados on July 1st, 1945 and Mr. Warrington along with the local engineers continued the erection of the machines until he was compelled by reason of ill health to leave the colony on October 15th of the same year.

From this date, until the arrival of the present writer on July 20th, 1946, constant vigilance was needed to prevent the idle intricate machines from rusting. It was found to be no easy task with a relative humidity as high as Barbados. When the machines are working however, the passage of the cotton through the various processes and the natural wax on the fibres themselves will prevent this trouble.

Although the machines at the present time appear little different from what they did a year ago; substantial progress has been made. When the various speeds and drafts were calculated, many of them proved quite unsatisfactory for cotton spinning. No regard whatever seems to have been taken to co-ordinate the different speeds etc., although to a practical cotton spinner, they are of vital importance.

These speeds had first to be ascertained and then changed to suit the type of cotton it was proposed to use and the counts of yarn needed. This meant the changing of pulleys, motors and spur wheels. Most of these wheels were found at the plant itself and came out with it in the first place; but others had to be made in Barbados. Some idea of the changes which had to be made can be gathered from the following spindled speeds :—

	<i>Before Alteration</i>	<i>After Alteration.</i>
Slubber	557 r.p.m.	495 r.p.m.
Intermediate Frame ..	1,059 r.p.m.	860 r.p.m.
Ring Frame	15,348 r.p.m.	7,190 r.p.m.

The 'Draw Frame' was set to deliver 'sliver' at about twice the normal rate of delivery. The 'Carding Engines' were running a little too slow. The spacing of the 'winding coils' on the Slubber and Intermediate Frames were much too close. The machines would also have been dangerous to the untrained operatives with unfenced belts and protruding key heads. Something has been done during the year to make these machines safer; but when the plant comes into operation a few more guards and safety devices will need to be adopted.

Consideration was also given during the year to making the plant more commercial and less experimental should it be made to produce yarn or thread in the near future. Within the present building, by the addition of a few more machines and the re-arrangement of the existing ones, it was found possible to more than double the present theoretical output of the plant.

A great deal of thought was also given to the possibility of establishing in Barbados a fully commercial plant. For it must be remembered that cotton spinning is the foundation of many industries and since cotton is one of the products of Barbados, spinning is a logical secondary industry.

With a supply of good quality yarn, Barbados could next attempt to establish a weaving industry by importing power driven looms. She could also make fishing lines, string, ropes, sail cloth etc., all of which have to be imported and paid for by the fruits of agriculture.

Weaving, Doubling, Knitting, Bleaching, Dyeing and Finishing are all major industries in the United Kingdom and each gives full time employment to thousands of work people. All these industries use cotton yarns as raw material. Therefore, if the West Indies desire almost any form of textile industry, it is absolutely imperative to make a success of cotton spinning. It should be noted too, that cotton spinning machinery with very little modification is used for the manufacture of yarn of artificial fibres.

The Card-mounting machine arrived in the colony in September 1946 and the old and previously condemned card clothing was re-examined to see if it could possibly be made to produce a sliver. It was decided to clean it as far as practical and by stitching three lengths together mount it in position. The teeth which were too rusty to clean and all the badly damaged ones were extracted before the clothing was put in position. With the fillet in position further cleaning was carried out by dusting the teeth with powdered bath brick and brushing it out again. This operation was carried out many times before the fillet could be considered in reasonable condition.

Then followed several days grinding both with the "dead roller" and the "traverse grinder".

After carefully setting the different organs of the card, cotton was fed to the machine and a fairly good sliver produced. When sufficient sliver had been produced the draw frame was set to work and a sufficient number of spindles on each subsequent machine to commence the training of operatives. There were a large number of applicants for the five trainee positions which were required to be filled. The five eventually engaged have proved themselves capable of absorbing the necessary technical instruction incidental to a cotton operative's work.

By far the greatest difficulty at the moment is rust and badly erected machines. The flyers and the rings on the spinning machine cause a great deal of trouble. It is only by keeping the yarn coarse that any headway is being made. Eventually however the passage of the cotton through the flyers and the passage of the traveller around the rings should polish them, sufficiently to spin much finer yarns. Although they will never be sufficiently polished to spin yarn fine enough to warrant the use of the locally grown Sea Island cottons. Another difficulty is the lack of "change wheels" and whenever better manipulation of the cotton is required considerable trouble is experienced through having to "make do and mend". A few more change wheels have been ordered from England and should be delivered soon.

While the girls are learning, a considerable amount of waste is being made and is sold locally. The amount of "hand waste" is being reduced and will be further reduced as more skill is acquired. The yarn spun is being made into twine suitable for tying parcels etc., but it is hoped that in the future fishing line suitable for making nets will be produced.

PART IV.

FINANCIAL STATEMENT

Expenditure and Revenue for the Financial Year 1946—47

EXPENDITURE

	£	s.	d.
Personal Emoluments	11,938	2	11
Travelling Allowances	1,750	15	1
Exhibition Expenses	149	15	3
Expenses in Control of Cotton Diseases (Salaries of Sub-Inspectors)	216	13	4
Unforeseen Contingencies	57	3	0
Extra Clerical Assistance	177	14	10
Stationery	94	11	5
Library	79	5	7
Destruction of Rats and Beetles	217	10	0
War Bonus	996	5	5
Experiment Stations and Botanic Station	5,566	19	5
Chemical Laboratory	486	14	10
Entomology	1,583	19	9
Science Teaching at Harrison College	1,493	9	11
Analyses of Commercial Sugars	1,534	12	4
Upkeep of Government Lands	36	0	8
Purchase of Motor Lorry	461	8	2
Cost of Living Allowance	2,525	19	2
	£29,367	1	1

REVENUE

	£	s.	d.
Sale of Ornamental Plants	97	12	3
Sale of Produce from Codrington Experiment Station	1,132	19	2
Fees for Analyses of Sugars and Molasses	2,363	8	0
Fees for Analyses of Miscellaneous Samples	72	0	0
Sale of Vegetable Seeds, Insecticides etc.	927	5	7
Deposits on Pots	69	2	2
Miscellaneous Receipts	22	15	11
Sale of Motor Lorry	70	13	0
	£4,755	16	1

PART V.

AGRICULTURAL LEGISLATION

1. 1946—32. 30th September, 1946.

An Act to amend the Department of Science and Agriculture Act 1925 (1925-5).

This Act makes provision for the appointment of :—

- (a) One Senior Peasant Agricultural Instructor at a salary of £325 per annum, rising by annual increments of £25 to £450 per annum and reduces the existing number of Peasant Agricultural Instructors from twelve to eleven.
- (b) One Senior Analytical Assistant at a salary scale of £325 per annum rising by annual increments of £25 to £450 per annum and reduces the number of existing Analytical Assistants from three to two.

2. 1946—33.—30th September, 1946.

An Act to amend the Cotton Diseases Prevention Act 1928 (1928—7). This Act provides for a change in the salary scale of the Plant Diseases Inspector from £75 per annum to £325 per annum to £325 per annum rising by annual increments of £25 to £450 per annum.

3. 1947—4 24th March, 1947.

An Act to provide for the regulation of the fishing industry.

This Act authorises the Governor-in-Executive Committee to make regulations for the purposes of (a) insuring the safety and welfare of men working on fishing boats or otherwise engaged in the fishing industry, and (b) promoting and fostering the interests and welfare of the fishing industry in general.

PART VI.

LIST OF PUBLICATIONS ISSUED BY THE DEPARTMENT OF SCIENCE AND AGRICULTURE AND B.W.I. CENTRAL SUGAR CANE BREEDING STATION FROM 1925 TO DATE

DEPARTMENT OF SCIENCE AND AGRICULTURE

Reports:

- Report on the Sugar-Cane Experiments for the Season between 1923—25, by J. P. D'Albuquerque, M.A., F.I.C., F.C.S.
- Report on the Sugar-Cane Experiments for the Season between 1924—26, by J. P. D'Albuquerque, M.A., F.I.C., F.C.S.
- Report on the Department of Agriculture, Barbados, 1925—26.
- Annual Report of the Department of Agriculture, 1926—27.
- Report of the Department of Agriculture, Barbados, 1927—28.
- Annual Report of the Department of Science and Agriculture, 1928—29.
- Report of the Department of Science and Agriculture, Barbados, 1929—30.
- Report of the Department of Science and Agriculture, Barbados, 1930—31.

Agricultural Journals:

- Vol. 1 No. 1, Jan., 1932 *An Investigation into the Evolution of Sugar Cane Varieties by breeding in Barbados, 1887—1925, with a discussion on the Application of the Findings to the present day Scheme of Work*, by A. E. S. McIntosh, B.Sc., Ph.D.
(*Out of Print*)
A Survey of the Position of *Phytalus smithi*, Arrow, and its Natural Enemies in Barbados by R. W. E. Tucker, M.A., B.Ed.,
The Scientific Control of Pan Boiling by S. J. Saint, M.Sc., Ph.D.
The Status of Trichogramma as a Control of *D. saccharalis* in Barbados by R. W. E. Tucker, M.A., B.Ed.
The Inversion of Sucrose in Syrup Manufacture by C. A. Coppin, B.A.Sc., (Toronto).
Some Aspects of the Flora of Barbados by F. Hardy, M.A., F.G.S.
Memorandum on the Cotton Situation in Barbados.
- Vol. 1 No. 2, April, 1932 *Report on the Work of the Department of Science and Agriculture for the Year ending June 30, 1932.*
Some Aspects of the Flora of Barbados (Contd.) by F. Hardy, M.A.
- Vol. 1 No. 3, July, 1932 *Report of the Geneticist for 1931—32.*
Some Aspects of the Flora of Barbados by F. Hardy, M.A.
- Vol. 1 No. 4, Oct. 1932 *A Discussion of the Results of Manurial Trials carried out on Sugar Cane in Barbados 1928—32.*
Some Aspects of the Flora of Barbados by F. Hardy, M.A.
- Vol. 2 Nos. 1 and 2, April, 1933 .. *Report on the Work of the Department of Science and Agriculture for the Year ending June 30th, 1933.*
Some Aspects of the Flora of Barbados (Concl'd) by F. Hardy, M.A.
- Vol. 2 No. 3, July, 1933 *Report of the Geneticist for the Year 1932—33.*
- Vol. 2 No. 4, Oct., 1933 *Manurial Trials with Sugar Cane by S. J. Saint, M.Sc., Ph.D. Rate of Egg Deposition of D. Saccharalis and Extent of Larval Mortality in Canefields and their Relation to Control of Diatraea by T. minutum by R. W. E. Tucker, M.A., B.Ed. Varietal Factors in Cane which may influence extent of Oviposition by D. saccharalis and a possible method for Determining Varietal Susceptibility to Borer Attack by R. W. E. Tucker, M.A., B.Ed.*
- Vol. 3 No. 1, Jan., 1934 *Sugar Cane Growth Measurements in Barbados by A. E. S. McIntosh, B.Sc., Ph.D.*
A Contribution towards the Solution of the Problem of Control of the real mortality of *D. saccharalis* due to egg parasites, egg predators, natural larval mortality, larval parasitism and other factors by R. W. E. Tucker, M.A., B.Ed.

- Vol. 3 No. 2, April, 1934 Report on the Work of the Department of Science and Agriculture for the year ending March 31st, 1934.
- Vol. 3 No. 3, July, 1934 The Coral Limestone Soils of Barbados by S. J. Saint, M.Sc.
- Vol. 3 No. 4, Oct. 1934 Report of the Geneticist for the Year 1933—34.
A Further Contribution to the Analysis of Field Data on *D. saccharalis* in Barbados by R. W. E. Tucker, M.A., B.Ed.
- Vol. 4 No. 1, Jan. 1935 Manurial Trials with Sugar Cane.
(Out of Print) The Control of *D. saccharalis* in Sugar Cane in Barbados by frequent liberation of mass reared *Trichogramma*, by R. W. E. Tucker, M.A., B.Ed.
- Vol. 4 No. 2, April, 1935 Report on the Work of the Department of Science and Agriculture for the Year ending March 31st, 1935.
- Vol. 4 No. 3, July, 1935 Report of the Geneticist for the Year, 1934—35.
- Vol. 4 No. 4, Oct., 1935 Manurial Trials with Sugar Cane.
Sugar Cane. A Summary of Plantation Variety Yield Returns for Season 1933—35, by A. E. S. McIntosh, B.Sc., Ph.D.
Juice Analyses in Relation to the Fertilizer Requirements of Barbados Soils, by S. J. Saint, M.Sc., Ph.D.
- Vol. 5 No. 1, Jan., 1936 Parasites Introduced into Barbados for Control of Insect Pests by
(Out of Print) R. W. E. Tucker, M.A., B.Ed.
Investigations into the Use of the Zeiss Hand Refractometer by A. E. S. McIntosh and G. C. Stevenson.
- Vol. 5 No. 2, April, 1936 Report on the Work of the Department of Science and Agriculture for the Year ending March 31st, 1936.
- Vol. 5 No. 3, July, 1936 The Yield of Sugar Cane in Barbados, in 1936.
Report of the Botanist for the Year 1935—36.
- Vol. 5 No. 4, Oct., 1936 A Preliminary Investigation into Cane Varieties and Infestation by
(Out of Print) *D. saccharalis* by R. W. E. Tucker, M.A., B.Ed.
- Vol. 6 No. 1, Jan., 1937 Manurial Trials with Sour Grass, by S. J. Saint, M.Sc.,
(Out of Print) Manurial Trials with Sugar Cane, by S. J. Saint, M.Sc.
Sugar Cane Spacing Experiments by G. C. Stevenson, B.A.
- Vol. 6 No. 2, April, 1937 Report on the Work of the Department of Science and Agriculture
(Out of Print) for the Year ending March 31st, 1937.
- Vol. 6 No. 3, July, 1937 The Yield of Sugar Cane in Barbados, 1937.
Report of the Botanist for the Year 1936—37.
- Vol. 6 No. 4, Oct., 1937 The Control of Scarabee in Barbados by R. W. E. Tucker, M.A., B.Ed.
(Out of Print) Larval Dispersion of *D. saccharalis*, by R. W. E. Tucker, M.A., B.Ed.
- Vol. 7 No. 1, Jan., 1938 Manurial Trials with Sugar Cane by S. J. Saint, M.Sc., Ph.D.
An Account of an Experiment to Determine the Efficiency of two Weed-Killing Sprays.
Experiments with the Dwarf Banana.
String Bean Variety Trial, Codrington, 1937.
Experiments in the Use of Hortomone A to Stimulate Rooting and Establishment in Cuttings of Ornamental Plants.
- Vol. 7 No. 2, April, 1938 Report on the Work of the Department of Science and Agriculture
(Out of Print) for the Year ending March 31st, 1938.
- Vol. 7 No. 3, July, 1938 The Yield of Sugar Cane in Barbados in 1938.
Report on Sugar Cane Breeding and Seedling Testing for the Year 1937—38 by A. E. S. McIntosh.

- Vol. 7 No. 4, Oct., 1938 Experiments in the Growing of Tomatoes and shipment to Canada.
(*Out of Print*) Co-operative Sugar Cane Spacing Experiments. Sweet Potato Storage Experiments.
- Vol. 8 No. 1, Jan., 1939 Manurial Trial with Sea Island Cotton by S. J. Saint, M.Sc.
Cotton Growing and Cotton Pests Control by R. W. E. Tucker, M.A., B.Ed.
The Control of *D. abbreviatus*, L. and *L. (Phytalus) smithi*, Arrow in Barbados surveyed over a period of eleven years by R. W. E. Tucker, M.A., B.Ed.
- Vol. 8 No. 2, April, 1939 Report on the Work of the Department of Science and Agriculture for the Year ending 31st March, 1939.
- Vol. 8 No. 3, July, 1939 The Yield of Sugar Cane in Barbados in 1939.
Report on Sugar Cane Breeding and Seedling Testing for the Year 1938—39 by A. E. S. McIntosh.
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 B. Sugar Cane Mosaic Disease in Jamaica and Barbados, by B. deL. Inniss, B.Sc.
 C. Report on a Visit to Trinidad, February, 1944, by A. E. S. McIntosh, B.Sc., Ph.D.
- No. 27—November, 1944 Report on a Visit to British Guiana, July and August, 1944, by A. E. S. McIntosh.
- No. 28—October, 1944 The Yield of Sugar Cane in Barbados in 1944.

APPENDIX I

Meteorological Observations Recorded at the Meteorological Station, Codrington

Height above Sea Level 181 Feet.

Latitude 13° 7' 36" N. Longitude 59° 35' 57" W.

The following are the summaries of the observations recorded for the year 1946. The details are given in Appendix II.

Barometric Pressure. The records refer to observations made at the hours of 9.00 a.m. and 3.00 p.m. only and are expressed in inches of mercury. During the year 1946, the mean pressure corrected for temperature and gravity and reduced to sea-level, was at 9.00 a.m. 29.981 and at 3.00 p.m. 29.907, the highest pressure recorded being 30.131 on the 21st of February, and the lowest 29.658 on the 12th of November. For the ten-year period 1936—1945 the average barometric pressure was at 9.00 a.m. 29.978 and at 3.00 p.m. 29.904. The highest pressure recorded at 9.00 a.m. during the ten-year period was 30.121 on the 9th of July, 1940, and the lowest pressure recorded at 3.00 p.m. was 29.674 on the 13th of November, 1944.

Temperature. The daily mean maximum temperature for the year 1946 was 85.3°F. and the daily mean minimum 72.4°F. The maximum extreme for the year was 89.5°F. registered on the 18th and 24th of October and the minimum extreme was 61.5°F. registered on the 9th of January. The average monthly mean temperature was 78.8°F., the highest monthly range 26.0°F. and the lowest 15.0°F., the mean monthly range being 19.3°F. For the ten-year period 1936—1945 the daily mean maximum was 85.2°F., and the daily mean minimum 71.9°F. During the ten-year period the average monthly mean temperature was 78.5°F.; the maximum extreme was 95.0°F. on the 21st of August, 1943, the minimum extreme 60.5°F. on the 29th of February, 1944, and the average monthly range 19.0°F.

Tension of Vapour and Relative Humidity. The mean tension of vapour for the year 1946 was at 8.00 a.m., .746, and at 5.00 p.m. .720. The mean relative humidity was at 8.00 a.m., 73.8 per cent. and at 5.00 p.m. 69.5 per cent.

Wind. The daily (24-hour period) mean velocity of the wind during the year 1946 was 10.2 miles an hour. Records were kept of half-daily or 12-hour periods from 6.00 a.m. to 6.00 p.m. and 6.00 p.m. to 6.00 a.m. The maximum velocity for any such 12-hour period was 24.4 miles an hour, recorded between 6.00 a.m. and 6.00 p.m. on the 25th of January and the minimum velocity 1.7 miles an hour, recorded between 6.00 p.m. and 6.00 a.m. on the 3rd of October. The average daily (24-hour period) velocity for the ten years ended 1945 was 10 miles an hour.

Rainfall. The rainfall measured at the Government Meteorological Station during the year 1946 amounted to 41.15 inches. Rainfall was recorded on 171 days, the greatest fall being 2.54 inches on the 24th of July. For the ten-year period 1936—1945 the average total rainfall was 51.83 inches and the average number of days annually on which rain fell was 197.

Rainfall of the Island. The average total rainfall for the year 1946 from 65 stations was 46.65 inches, being 13.22 inches below the average for the ninety-nine years ended December 31st, 1945, which was 59.87 inches.

METEOROLOGICAL REPORT FOR 1946

MONTHS	Mean Pressure corrected to 32° F Latitude 45° and Mean Sea Level					TEMPERATURE °F								TENSION OF VAPOUR			RELATIVE HUMIDITY			Rainfall	No. of Days on which Rain Fell			
	9 a.m.	3 p.m.	Mean	Highest	Lowest	Max. Mean	Min. Mean	Max. Extreme	Min. Extreme	Mean for Month	Range for Month	Dew Point 8 a.m.	Dew Point 3 p.m.	Mean	8 a.m.	3 p.m.	Mean	8 a.m.	3 p.m.			Mean	Velocity Miles per Hour	
January	30.008	29.926	29.967	30.064	29.863	83.1	69.9	87.5	61.5	76.5	26.0	69.1	67.1	.692	71.4	.670	.692	79.7	70.2	74.9	10.2	2.16	19	
February	30.019	29.933	29.976	30.131	29.872	82.5	70.1	84.0	63.5	76.3	20.5	66.1	64.6	.628	.646	.610	.628	73.2	64.3	68.7	12.4	2.15	18	
March	30.003	29.923	29.963	30.071	29.871	84.4	70.2	86.5	67.0	77.3	19.5	66.5	65.7	.643	.655	.632	.643	69.8	63.9	66.8	10.5	0.58	7	
April	29.984	29.911	29.947	30.028	29.857	85.8	71.5	87.0	67.5	78.6	19.5	68.1	66.0	.668	.692	.644	.668	67.2	61.9	64.5	10.8	2.11	9	
May	29.989	29.922	29.955	30.031	29.835	86.5	74.7	87.5	72.5	80.6	15.0	70.4	70.3	.748	.748	.748	.748	71.0	70.0	70.5	13.6	2.63	15	
June	30.029	29.967	29.998	30.088	29.905	86.3	74.6	87.5	70.5	80.4	17.0	71.1	72.6	.785	.763	.807	.785	73.6	74.7	74.1	14.0	2.69	14	
July	30.010	29.950	29.980	30.058	29.898	86.2	74.2	88.0	70.5	80.2	17.5	71.6	70.2	.758	.775	.742	.758	72.9	68.8	70.8	11.5	5.40	16	
August	29.988	29.919	29.953	30.022	29.887	86.3	74.0	88.0	72.0	80.1	16.0	72.6	70.9	.778	.798	.758	.778	74.5	68.7	71.6	8.7	5.78	14	
September	29.958	29.889	29.923	30.014	29.806	85.8	72.8	87.0	69.5	79.3	17.5	73.0	71.7	.796	.807	.785	.796	75.5	75.4	75.4	6.8	5.98	10	
October	29.935	29.856	29.895	29.993	29.803	87.1	72.5	89.5	68.0	79.8	21.5	72.3	70.9	.775	.795	.755	.775	73.1	70.1	71.6	7.1	1.94	14	
November	29.915	29.829	29.872	29.982	29.658	86.2	72.5	88.5	68.0	79.3	20.5	71.5	70.8	.765	.775	.756	.765	74.4	72.7	73.5	8.1	3.34	10	
December	29.937	29.861	29.899	29.999	29.795	83.9	71.9	88.0	67.0	77.9	21.0	71.9	69.9	.760	.783	.737	.760	80.6	73.4	77.0	8.7	6.39	19	
TOTAL	359.775	358.886	359.328	360.481	358.050	1024.1	868.9	1049.0	817.5	946.3	231.5	844.2	830.7	8.796	8.951	8.644	8.796	85.5	834.1	859.4	122.4	41.15	171	
AVERAGE	29.981	29.907	29.944	30.040	29.837	85.3	72.4	87.4	68.1	78.8	19.3	70.3	69.2	.733	.746	.720	.733	73.8	69.5	71.6	10.2	3.43	14	

APPENDIX
Barbados Rainfall from January

NAME OF STATION	Number of Stations	January		February		March		April		May		June
		Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches	
DISTRICT "A"—ST. MICHAEL Lowlands ...	7	17	3.20	13	2.09	4	.51	8	1.96	12	2.74	12
DISTRICT "B"—CHRIST CHURCH Lowlands ...	6	13	2.62	8	1.30	4	.79	6	1.37	9	2.77	11
—ST. GEORGE Highlands ...	1	19	4.78	9	3.25	6	1.66	9	2.15	13	4.90	12
Lowlands ...	5	15	3.42	8	1.99	5	.59	8	1.13	12	3.50	10
DISTRICT "C"—ST. PHILIP Highlands ...	2	17	3.62	12	1.80	6	1.12	8	1.40	15	3.25	13
Lowlands ...	7	16	2.99	9	1.40	6	.87	8	1.16	10	3.67	13
—ST. JOHN Highlands ...	6	20	4.55	15	2.82	10	.95	11	3.08	15	4.91	15
Lowlands ...	1	13	4.24	6	1.90	5	.91	7	2.78	11	3.25	9
DISTRICT "D"—ST. THOMAS Highlands ...	5	18	5.83	14	3.53	8	.99	13	3.29	20	4.93	16
Lowlands ...	2	17	4.61	9	3.06	6	1.04	10	3.31	16	4.20	14
—ST. JAMES Highlands ...	1	14	4.84	13	3.18	8	.93	13	6.24	18	4.55	14
Lowlands ...	5	17	4.10	12	2.54	6	.62	10	5.74	14	3.29	15
DISTRICT "E"—ST. PETER Highlands ...	1	7	3.07	4	1.03	3	.37	5	4.31	6	1.66	8
Lowlands ...	4	13	3.93	8	2.03	5	.79	7	6.59	11	3.98	12
—ST. LUCY Lowlands ...	3	15	3.28	7	1.12	3	.40	7	4.18	8	2.10	13
DISTRICT "F"—ST. JOSEPH Highlands ...	4	19	4.84	13	2.59	8	.88	12	4.69	15	3.71	16
Lowlands ...	1	17	4.75	7	1.57	5	.42	3	2.70	9	2.70	13
—ST. ANDREW Highlands ...	2	16	4.91	10	1.84	2	.59	7	7.57	12	2.90	12
Lowlands ...	2	15	3.01	10	1.28	4	.41	8	4.75	14	1.88	13
Total ...	65	298	76.59	187	40.32	104	14.84	160	68.40	240	64.89	241
AVERAGE ...		16	4.03	10	2.12	5	.78	8	3.60	13	3.42	13

II

y to December, 1946

June	July		August		September		October		November		December		TOTAL	
Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches	Days	Inches
2.49	17	5.32	14	7.60	16	7.09	10	2.11	10	2.84	15	6.26	148	44.21
2.36	15	4.09	12	4.19	15	7.53	9	2.59	12	2.82	13	6.52	127	38.95
3.25	14	6.67	13	8.94	12	7.30	11	5.27	14	5.25	15	6.94	147	60.36
2.81	14	5.19	13	7.48	16	6.82	11	2.54	13	3.38	19	9.03	144	47.88
2.24	21	4.77	19	4.24	15	6.13	13	3.97	13	2.67	19	7.73	171	42.94
2.53	18	3.83	16	5.61	14	6.73	13	2.99	12	4.10	15	7.17	150	43.05
3.25	22	5.41	18	4.96	15	5.88	14	3.78	14	3.13	20	7.20	189	49.92
2.62	18	3.85	12	2.25	17	5.17	12	2.97	8	1.91	14	4.07	132	35.92
4.44	23	6.89	20	7.06	19	6.92	17	3.56	16	5.02	21	7.69	205	60.15
3.75	17	5.69	17	8.22	15	7.37	14	3.37	9	4.65	14	6.81	158	56.03
4.96	22	6.81	23	6.73	15	5.85	16	2.47	14	5.18	19	5.76	189	57.50
3.22	19	5.47	16	7.34	16	7.31	11	2.17	10	3.77	14	5.93	160	51.50
3.27	14	5.18	7	2.84	12	4.48	9	2.11	10	5.35	11	5.51	96	39.18
3.57	16	5.74	13	5.71	13	5.03	10	2.11	11	4.37	13	3.67	132	47.52
5.11	16	5.60	14	3.29	14	4.63	8	2.05	10	4.67	10	3.63	125	40.06
4.24	24	5.88	19	4.91	20	5.23	15	2.80	14	3.99	18	5.56	193	49.32
3.12	19	3.60	17	4.10	17	4.50	12	2.02	7	2.54	14	2.94	140	34.96
4.65	16	6.06	17	6.06	14	4.39	10	2.00	13	4.81	16	4.14	145	49.92
2.96	20	4.62	17	5.73	12	4.00	10	1.80	8	3.45	13	3.10	144	36.99
64.84	345	100.62	297	107.26	287	112.36	225	52.68	218	73.90	293	109.66	2,895	886.36
3.41	18	5.30	16	5.65	15	5.91	12	2.77	11	3.89	15	5.77	152	46.65

